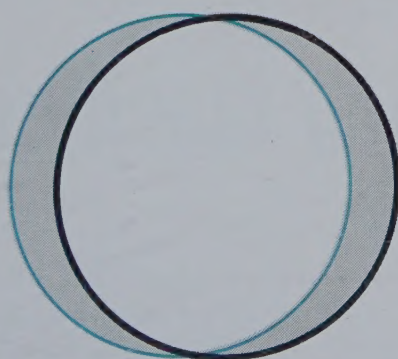
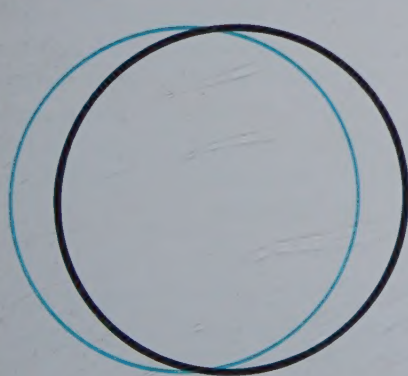
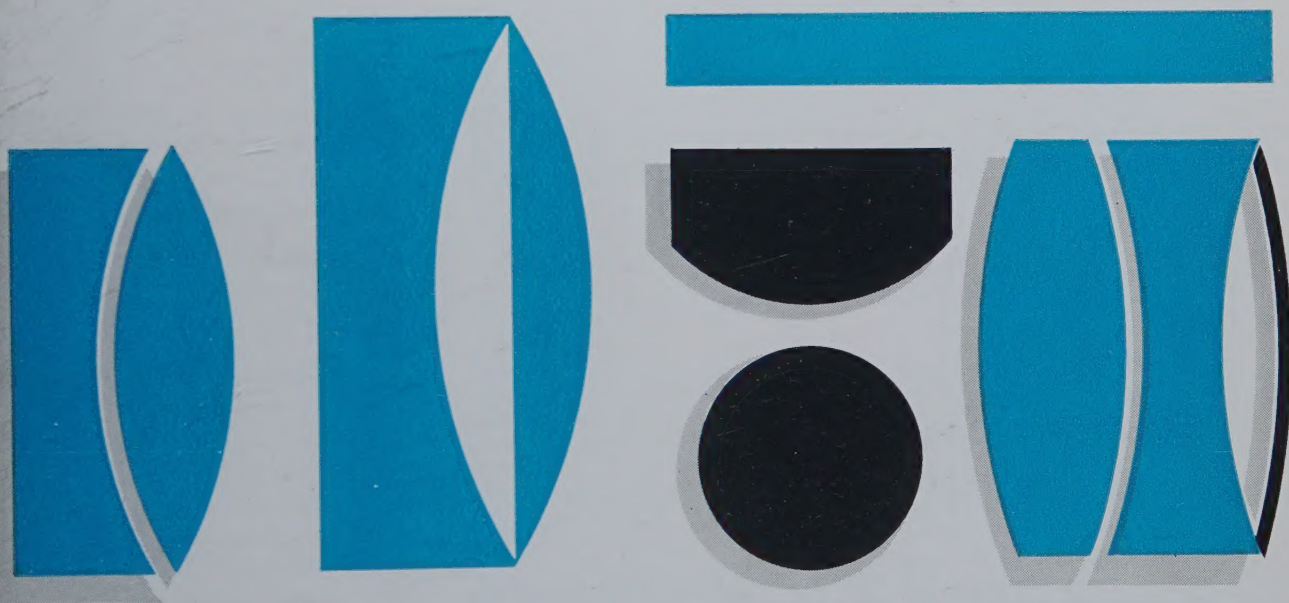


GRAPHIC SCIENCE

THE MAGAZINE FOR DRAFTSMEN

Drafting Department
Dynamics: Perkin-Elmer
Page 13



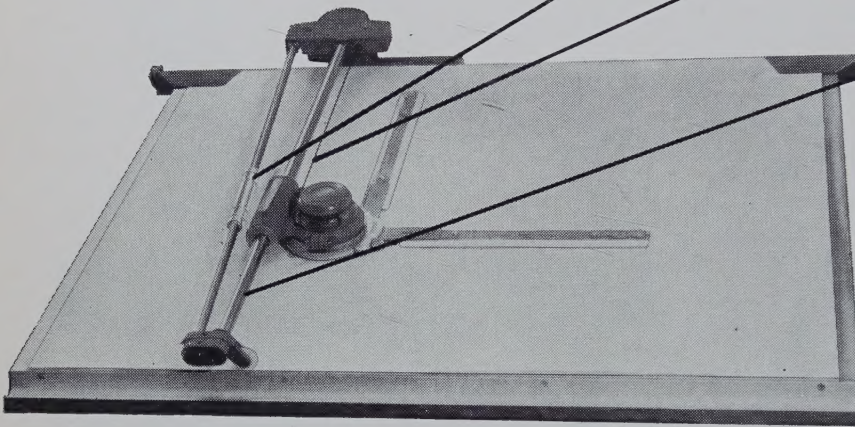
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GRAPHIC SCIENCE

THE MAGAZINE FOR DRAFTSMEN

APRIL 1960

THIS ISSUE: 11,500 COPIES

VOLUME 2 NUMBER 4

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Publisher

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DEPARTMENTS

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GRAPHIC SCIENCE—offering complete coverage of drafting, technical illustration and reproduction for chief draftsmen, supervisors and instructors.

GRAPHIC SCIENCE is published monthly by Kinelow Publishing Company, Inc., 103 Park Avenue, New York 17, N. Y. (Murray Hill 5-1745). Charles E. Rhine, president; Paul Yake, vice president; David Z. Orlow, secretary-treasurer. GRAPHIC SCIENCE is published (printed) at 116

Main St., Norwalk, Conn. Address changes, undeliverable copies, and orders for subscriptions should be sent to Editorial Offices, 103 Park Avenue, New York 17, N. Y.
Postmaster: Form 3579 requested.
Subscription rates: \$8.00 per year in the United

States; \$9.00 per year to Canada; \$10.00 per year to other countries. Single copies: \$1.00.

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Letters

Humor Department

Sirs:

We are not quite sure whether in the literature sent . . . we have included a set of humorous postcards which some time ago we had made for distribution among our customers and which have found a very good reception. The illustrations on these postcards are of a somewhat similar type as the sketches which under the heading "Smudge" you regularly publish in your magazine and which we have studied with great fun.

In order to be on the safe side we are sending you under separate cover two sets of these postcards, thinking that you might eventually be interested in publishing some of them, together with some significant phrases or words which meet the American humor. At the back of one of the postcards you will find, for example, a phrase which an English customer has created for the respective picture.

FRANZ KUHLMANN KG.

Prazisionsmechanik und

Maschinenbau

Wilhelmshaven, Germany

Editor's Note: "Horizontalitis."

Wanted: Good Drawing Numbering Systems

Sirs:

I think our company and many companies of our relative size have come up against the problem of a numbering system for drawings.

In the electronic field there are so many different parts to contend with, that it is very difficult to keep up with the drawing numbers and the duplication of drawings for said parts. Not only does this add confusion, but the addition of special drawings for reports, installations and instructions gives the whole drafting department a maze of "under what number do we put this drawing."

What I am looking for is a simple, but effective numbering system that can give us the flexibility to grow and yet at all times keep good control of the drawings.

JOHN J. MATONE, JR.

Design and Drafting Supervisor

Franklin Systems, Inc.

West Palm Beach, Florida

Sirs:

We are considering a modification of our drawing numbering system for

both production and prototype designs of various equipment. We would appreciate any information or reference material you may send or suggest to us as a guide for selecting the best type of drawing numbering system for our needs.

Your assistance in this regard would be greatly appreciated.

JOSEPH L. FORTUNATO

Chief Engineer

Welin Davit and Boat Division

Continental Copper & Steel Industries, Inc.

Perth Amboy, N. J.

Re: A Blueprint Reading Course

Sirs:

In response to his letter in GRAPHIC SCIENCE, February, 1960, I wish to suggest that Mr. R. S. Wallace send to The Macmillan Company, New York for a copy of *The Blueprint Language* by Spencer and Grant. I have had much experience teaching blueprint reading courses for industry and have used some textbooks written on this subject and I believe the Spencer and Grant book is the best of all. It is a combined text and work book, with tear-out sheets for sketching and drawing.

I do not know if you have ever taught before, but I would like to suggest that there is no such thing as a "ready-made" course. You have to "design" a course for the group you are serving. A book, such as Spencer and Grant have written, helps a great deal in that all types of blueprint courses have in common the fact that you have to begin with teaching view-reading. The text book material is a ready-made source of material that you can use at the introduction of any subject matter area such as—

1. Orthographic projection and multiview drawing or reading.
2. Sectional Views.
3. Dimensioning.
4. Screw Threads and Fasteners.

However, very early in the course you should use objects or piece part



(Letters to the editor should be addressed to 103 Park Avenue, New York 17, New York. Names will be withheld upon request but all must be signed.)

OZALID NEWSLETTER

NEWS AND IDEAS TO HELP YOU WITH ENGINEERING REPRODUCTION AND DRAFTING



Repro room at I-T-E, showing processing of Information Sheets and standard engineering drawings on Ozalid machines. Simple system saves hours of drafting time for the company.

Short-cut system for custom orders

To help turn out "job shop" work at assembly line speed, the I-T-E Circuit Breaker Company of Philadelphia has devised a simple "Information Sheet" that does away with considerable retracing and revising of engineering prints.

More than 70% of I-T-E orders are for custom-designed equipment using standard components. Revising standard drawings to meet customer specs on each order would saddle I-T-E's engineering department with a nearly impossible work load.

So the Information Sheet is used instead. It's an 8½" x 11" tracing form—with printed title blocks—quickly reproduced on the company's Ozalid whiteprinters. Here's how it works:

An order comes in—for 5KV metal-clad switchgear, for instance. A fast

freehand sketch of the switchgear is drawn on the Information Sheet. Drawing numbers of standard components and quantity of prints needed are noted on the Sheet.

Then, copies of the Sheet and the required standard drawings are run in the I-T-E repro room. These, with the shop order, go to Manufacturing. When the order is completed, the Information Sheet is returned to the customer file for reference.

This simple short cut with Ozalid whiteprinting saves untold hours of engineering time and gives I-T-E customers faster, more efficient service.

Colors speak louder than words

A simple way to make your security personnel's job a lot easier is to color-

code all classified material by using Ozalid sensitized color-copy papers. Colors don't have to be read. Guards can spot restricted or top-secret prints at a glance. Clerks can't make routing mistakes.

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Like a copy of our new Color-Coding Booklet? It tells how a truly versatile, full-range color-coding system can be yours with as little effort as it takes to run prints that are black on white.

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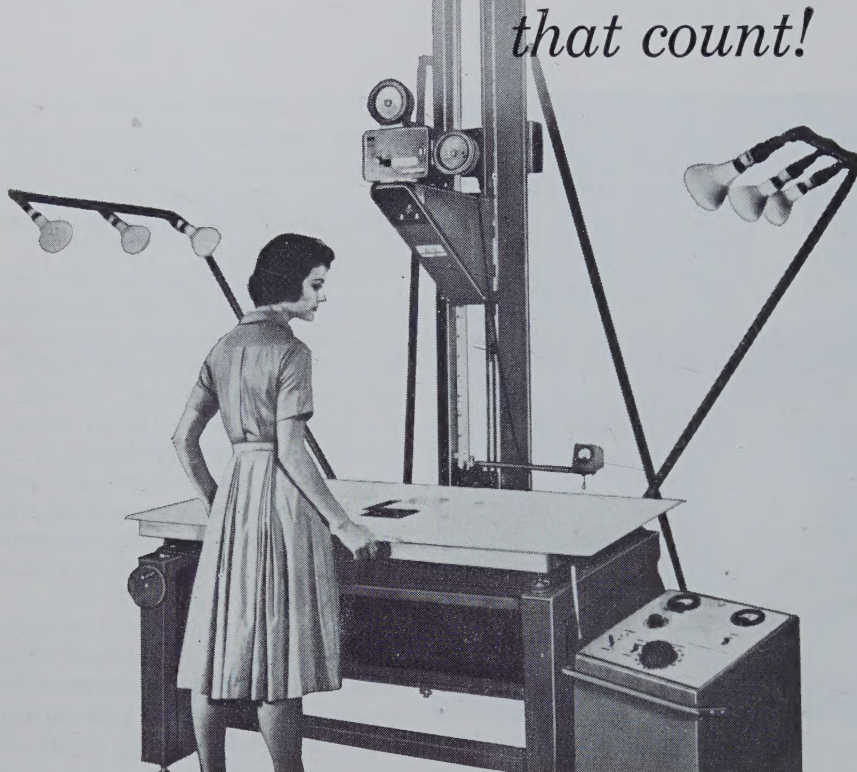


New blue-tint Ozacloth cuts glare, saves eyes

It's bad enough to have *people* glare at you. When your drafting materials glare too, one should take steps. Our research people have—by building a delicate blue tint into our new black-line Ozacloth 101 CZB. It provides excellent contrast between background and dye image—cuts glare, reduces eye strain, makes duplicate originals that are easy to read and work with. Other features? Highest printing speed of any cloth intermediate... and a plastic matte surface on both sides which accepts pencil, ink or typewriter... and keeps sheets from sticking together in files. Write Ozalid at Johnson City, New York, for free descriptive literature on blue tint Ozacloth.

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Letters

prints of drawings that are made by your company. This is a big motivation and interest technique. Start with very simple parts, early in the course. My experience has been that so often the drawings are such *good* examples of *poor* work on the part of the drafting department that I have often redrawn the views and put the notes in good form, etc., then had prints run for the class to use. You will have to develop questions to go along with the prints. Later on in the course I used the prints just as they came from the drafting room, just as the shop used them, and we were able to show, along with what we were learning, the extent to which the drawing was poorly drawn. In two smaller companies where I once taught blueprint reading for shop personnel, it resulted in up-grading the work of the drafting room.

W. M. CHRISTMAN, JR.
Chairman, Department of Engineering
Drawing And Descriptive Geometry
The University of Wisconsin—
Milwaukee
600 West Kilbourn Ave.
Milwaukee 9, Wis.

Wanted to Buy: Drafting Manuals
Sirs:

Please accept my thanks for a much-needed magazine. Can you tell me if I can purchase back copies of **GRAPHIC SCIENCE**, all those prior to the February 1960 issue?

In some future issue can you publish an article listing those companies who make their Drafting Manuals available to others? Article should include address, price, brief description of contents, pages, and the like.

ELMER CERNY

Drafting Supervisor
Beltone Research Laboratories
4850 West Belmont Ave.
Chicago 41, Ill.

Editor's Note: Back copies (a few are available) were sent. GRAPHIC SCIENCE will be happy to publish reviews of all Drafting Manuals or Standards which are forwarded to our offices at 103 Park Avenue, New York 17, N. Y. Be sure to include information regarding price, and person to contact when purchasing.



New Kodak Ektalith Loader-Processor, teamed up with office camera, lets you make photographic offset masters at one-per-minute speed

Look! "Desk space" is all you need to process photographic offset masters!

Kodak's new Ektalith Loader-Processor lets you make reduced, enlarged or same-size offset masters in full roomlight right next to your office camera.

This ingenious unit, which serves as a "desk top" darkroom, is used to load high-speed Kodak Ektalith Transfer Paper . . . and to process it after exposure in camera. Attached Kodak Ektalith Transfer Unit puts the image on a low-cost paper master which gives you sharp duplicator copies of all line work and a variety of halftones.

Big savings in systems work, too! Kodak Ektalith Method also lets you make 10 or more

high-quality direct paper copies—enlarged, reduced, or same size—without making plates or running your duplicator. This *big plus* is gained simply by adding a Kodak Ektalith Copy Unit to your setup.

Costs are low—less than \$800 for Ektalith Loader-Processor with Transfer and Copy Units.

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Graphic Perspective

by Eleanor W. Thompson

Editor's Note: Since our first "Graphic Perspective" page appeared in the maiden issue of GRAPHIC SCIENCE last October, some excellent sources of information relating to the development of graphical representation have been made available to us. Herewith, then, is our first guest-written "Perspective."

by Frederic G. Higbee

THE FIRST HALF of the 19th century might well be called a formative period in the development of graphic language; the science of orthographic projection was discovered and knowledge of it was disseminated; text books on drawing

and on descriptive geometry were written; schools were established and technical education was founded. And even more important for the future, a pressing need for technically trained leaders and a growing demand for increased production focused attention upon the new sciences by means of which these ever-increasing needs for expansion were to be satisfied.

The second half of this century was a period of growth, of change, of development, and of expansion so colossal and so fascinating that it deserves thoughtful study by every engineer.

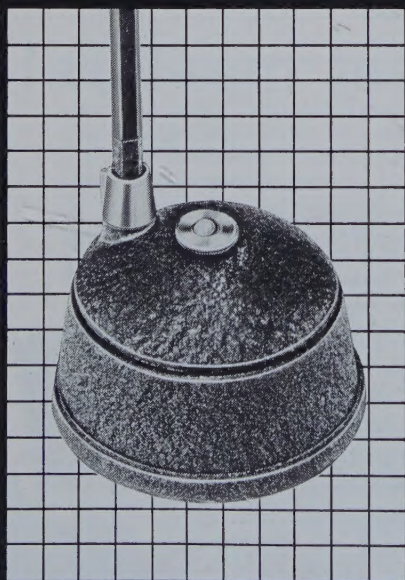
During the period from 1850 to 1900, the whole scheme of graphic representation underwent the same colossal change which was common

in all lines of endeavor. Military and Civil Engineering ceased to be designations sufficient to indicate the character of constructive undertakings, and engineering and engineering education became divided into branches. With each of these branches of engineering there arose a need for a kind and style of drawing in keeping with the nature of the undertaking, and thus came the day of specialization.

Along with, and stimulated by these developments and changes in the art of graphic representation, came improvements in drafting materials and instruments: the establishment in this country in 1850 of the pioneer American factory for manufacturing drafting instruments by the Alteneder family; the discovery, about 1840, of the blueprint process of reproduction and its introduction to the engineers of this country in 1878. During the first part of the 19th century, *draughtsmanship* was an art expressing itself in fine lines, shading both by lines and by washes, ornate borders, fancy lettering and the use of colors. But with the introduction of the blueprint process, all this was changed.

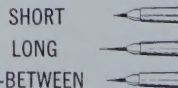
With this epoch-making event, modern drafting came into being. The demands of the high-speed industrial organization of which the drafting room found itself a part became so great, that shading, fancy borders, and ornamental lettering could no longer justify the time required to execute them; drawings became plainer and even severely plain, until now only that drawing which tells a complete story in the fewest lines is considered acceptable. Even the name which describes the making of a drawing has suffered from this process of

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This article is based on a portion of "The Development of Graphical Representation," by Frederic G. Higbee, published in the *Journal of Engineering Drawing*, May, 1958. The article was reprinted in the *Journal* by special permission of McGraw-Hill Book Company, from "Proceedings of the Engineering Drawing Division Summer School," conducted at Washington University, St. Louis, Mo., in 1946.

pruning; the art of *draughting* has been completely lost, but the business of drafting has been discovered!

This change is not to be deplored; the function of drawing is to produce and record results, and since the results obtained by use of modern drawings are unquestionably superior to those of earlier times, it is fair to assume that a part at least of this improvement is due to the change in drawing, while at the same time it can be admitted candidly that the greater part is due to improvements in manufacturing processes. Drafting and manufacturing are so interdependent, that development in the one is always accompanied by development in the other.

It was about this time that it became recognized that a drawing could accomplish what formerly had been considered, if not indeed impossible, at least impracticable—that is, infallibly to convey information to a workman. And with this fact established, model-making as an element in production became one of the lost arts.

The fact must not be overlooked that, once established as the dependable means of conveying facts, drawing played an important role in establishing our present scheme of production. And as the demand upon the drafting rooms grew, it must be recorded that draftsmen faced challenges at that time as stupendous as those thrown down before any group of workmen engaged in keeping pace with the colossal demands of production. More and more it was expected that information from the drafting room would be reliable, complete, and not ambiguous. More and more were draftsmen called upon to demonstrate that the so-called "unproductive" drafting room was worth what it cost. Caught, as it were, between the pressure of demands for results, and the problem of securing results in the face of lowering standards among the craftsmen who were responsible for the construction, the modern drafting rooms passed through a formative period which was revolutionary.

Thus it was that in the late '90s, the modern drafting room came into being as a part of the national industrial organization, and came to be accepted as an integral element in the scheme of production. And as a result of all this, draftsmen became conscious of themselves and of their profession.

DRAFTING TRENDS



Inspecting the "locked-in" black image of Post 208TC, Vapo Tracing Cloth, are Mort Fishman of Sabatino & Fishman, Architects, and Mike Ceglia of Bernard Sacks & Associates. Mike Conlin, sales representative of local POST dealer, Philadelphia Blueprint Company, looks on.

Philadelphia engineers save hours per tracing

Remarkable reductions in drafting time, up to 40 hours per tracing, have been achieved by Bernard Sacks & Associates, Philadelphia engineering consultants.

Specializing in heating, plumbing, ventilating, electrical and structural work, this firm receives basic floor plans from architect clients, then makes up separate detailed plans for each construction trade involved.

Bernard Sacks & Associates employs a system using Post 208TC Vapo Tracing Cloth, a positive-to-positive diazo process material. It reproduces with a dense, "locked-in" black image. The original drawing is reproduced on this intermediate product, one for each subcontractor. In most instances, film positives of standard details can be overlaid on the original drawing before the inter-

mediate is made, thus saving considerable drafting time.

Custom details or revisions are drawn directly on the 208TC intermediate, thanks to its excellent ink and pencil line receptivity. The finished plan is a combination of basic floor plan, transparent base overlays and additional drafting. It can be duplicated in quantity by any reproduction process.

Post Tracing Cloth intermediates, as in the above instance, are used in a wide variety of applications by many industries to help reduce costly board time. *For more information on Post 208TC (black image) or 209TC (sepia image), and how they can help your company produce drawings and prints more economically, write to Frederick Post Company, 3656 Avondale Avenue, Chicago 18, Illinois.*



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NEWS



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Notes & Comment

Standards

INDUSTRY'S STAKE in Military Drafting Practice is the subject of a forum at The Company Member Conference of the American Standards Association May 2-3 at the Sheraton Hotel, Philadelphia.

The forum of military and civilian authorities will be presided over by C. M. Wright, staff engineer, engineering division, Chrysler Corporation. An explanation of the military viewpoint regarding MIL D - 70327 will be presented by C. L. Miller, Armed Forces Supply Support Center and James H. Mars, Bureau of Naval Weapons.

Charles E. Hilton, Secretary of American Standards Association's Graphic Standards Board will explore the possible methods of military and industrial cooperation in drafting practices in his presentation.

The Company Member Conference is open to the public. Additional information regarding the program and standards manual exhibits can be obtained from Henry G. Lamb, Secretary, C.M.C. American Standards Association, 10 E. 40th St., New York 16, N. Y.

Remote Reproduction

A PICTURE RELAYING technique perfected by C.B.S. Laboratories, Division of C.B.S. Broadcasting System, Inc., reportedly makes possible the transmission of pictures from manned or unmanned aircraft and space vehicles with *no loss of detail*. CBS reports that the reproduction can be produced seconds after transmission from a photograph taken by aerial camera hundreds of miles away. The reproduction would be as sharp, if not sharper, than the original taken by the camera. Key to the process, tradenamed Photoscan, is said to be a newly developed electron tube.

For the story of a more down-to-earth remote reproduction system making it possible to transmit draw-

ings or blueprints coast-to-coast in five minutes, see the article on page 27.

And for the story of the drafting department program at one of the foremost producers of aerial cameras, see page 13!

Short Course for Supervisors

AN EFFECTIVE DRAFTING MANAGEMENT Institute, planned for chief draftsmen and drafting supervisors in product-type industries, is being sponsored by the University of Wisconsin, University Extension Division, Thursday April 7 and Friday, the 8th, in Madison. For details, contact Mr. Robert A. Ratner, Institute Coordinator, c/o University of Wisconsin, Madison 6, Wisc. immediately.

The program, built on a morning-lecture, afternoon - discussion format, lists as speakers: W. W. Thomas, Administrator Drafting-Coordination, RCA speaking on "The Philosophy of Drafting Department Organization." Charles H. Bayer, Manager, Drafting Consulting Service, General Electric Co., will speak on "Auditing Drafting Work." Third speaker, Marvin E. Setzke, Tool Engineer, The Miehle Co., will discuss "Dimensioning for Numerical Control."

Dinner meeting Thursday evening will have as speaker Frank H. Reighard, Supervisor Manufacturing Management Programs, University of Wisconsin. His talk: "Brainstorming—And its Application for Drafting Supervisors."

Friday speakers are John Conway, Director of Education and Training, A. O. Smith Corp., on "Motivation for Improved Performance"; Hans K. Gaertner, Chief of Drafting, Minneapolis-Honeywell Regulator Co., on "The Role of a Draftsman as a Designer, or Do We Really Have an Engineering Shortage?" and Ralph L. Paul, Principal Mechanical Engineer, Mechanical Services Division, Batelle Memorial Institute, on "Selecting and Training the High School Graduate as a Draftsman."



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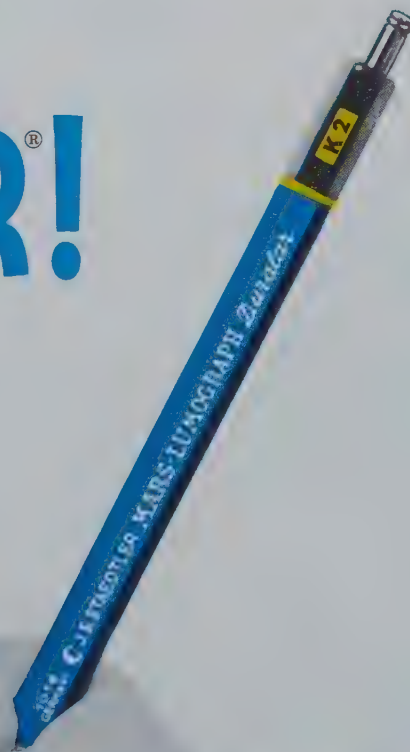
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Problem: How to Microfilm Old Drawings So They Can Be Read

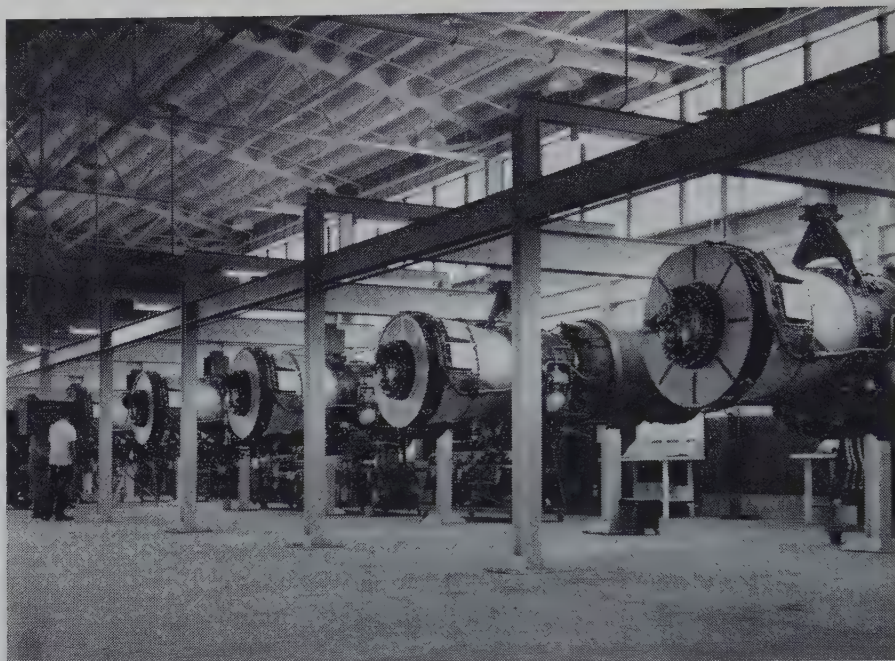
Microfilming is widely used for recording and storing the mountains of drawings and data individual companies must maintain. But to anyone who works with microfilmed drawings, they know the condition of the original is very critical in order to obtain a readable microfilm print. Faint lines, weak lettering and dimension markings, creases, and dirt smudges become impossible handicaps when the originals are first reduced 16 to 29 times and then enlarged for reading or reproduction. Today's advanced drafting techniques avoid this problem in new drawings, but what about a company's old drawings? Few are ever suitable for microfilming without extensive, meticulous restorative work. Yet, something must be done with these old drawings if the microfilm file is to be complete and useful.

Dietzgen answers this problem with a number of products and techniques developed for restoring old drawings



Dietzgen's "wash-off" process puts new life into old drawings quickly and inexpensively.

preparatory to microfilming. The Dietzgen "wash-off" process is preferred by many because no darkroom work is involved. Corrections are easily made on the "wash-off" media eliminating the tedious retouching of a photographic negative. Backgrounds come clean with a wipe of a brush or sponge so that even the finest line stands out sharp and clear. Today thousands of old drawings which appeared hopeless subjects for microfilming have been salvaged by



JETS, MISSILES AND DIAZOS

A large manufacturer of components for jet aircraft and guided missiles complained: "We're having trouble getting all the prints we need each day with our present printmaking facilities. We must step up our printing speed. However, we want to standardize on blue-line diazo prints and would like to run our printers at very nearly a constant speed. Also, we have to work with a wide range of reproducibles, which really complicates the problem."

Four companies coating diazo papers were given the problem. Two immediately said it was impossible. The third

submitted a specially coated stock which provided the speed but not the print quality required.

Dietzgen had answered similar problems before. With a slight formula change in one of the regularly catalogued Dietzgen diazo papers, the extra speed was added to all the other needed characteristics already in formulation. This custom-engineered product was tested and immediately adopted. It has since been used continuously for the company's large volume needs and is pronounced "perfect." Print production soared.

Dietzgen's long and broad experience with Diazo coatings and equally long and broad research program frequently combine to provide both counsel and advanced products not obtainable elsewhere.

Dietzgen products and techniques . . . and it's this experience which can prove invaluable to you if old drawings have handcuffed your company's microfilm program.

Drafting-Printmaking Booklet reports new techniques for solving engineering and production problems



This new 36 page booklet describes a wide variety of engineering and production problems that have been solved with advanced techniques in drafting and printmaking pioneered by Dietzgen. The concise, problem-solution approach suggests ways in which you may improve the

efficiency within your engineering department or eliminate production bottlenecks. Write today on your company letterhead for the Mechanics of Modern Miracles. Ask for Publication SPD2-D-123 Eugene Dietzgen Co., Chicago 14, Illinois.



Drafting Department Dynamics

Drafting personnel in Perkin-Elmer's Instrument Division Group are encouraged to grow and to participate creatively in the relatively new field of instrumentation.

by Ralph F. Scalò

AT A RECENT semi-annual review of all personnel in the Instrument Division of the Perkin-Elmer Corporation, we promoted a man from the reproduction group to junior draftsman. In his new job, this man will not only spend time at the board but eventually will find himself in our shops and laboratories, assembling the parts he drew or serving as an engineering aide or technician. The promotion represents his first step in a new system we have adopted based upon our philosophy that, through diversity in his work, each man must grow for his and the Company's best interests.

When this man was hired into the Reproduction Group, his background included three years of mechanical drawing in high school and a strong desire to become a draftsman. While in Reproduction, he became familiar with the types and qualities of our working drawings, the system for filing drawings and assembly parts lists, the change notice and distribution systems, organizational procedures, and

Company policy. He also became thoroughly familiar with the various reproduction techniques used.

As a Perkin-Elmer employee he became eligible to attend company-sponsored evening courses in basic physics, elementary optics and basic electronics. As a member of the Reproduction Group he attended lectures by outside consultants during working hours on such subjects as gearing, bearings, stampings, lubrication, and printed circuitry. In the evening he enrolled in formal courses in mechanical drawing at a local school and, upon satisfactory completion, was reimbursed in part through Perkin-Elmer's educational policy.

ORGANIZATIONAL STRUCTURE

BEFORE accompanying this man to his new environment in the Drafting Group, it may be well to outline briefly the organizational structure of the Engineering Department in the Instrument Division. The Engineering Department is headed by a

Director of Engineering, who—along with the Directors of Marketing, Manufacturing and Research—reports to the General Manager of the Division. Under the Director of Engineering, four Section Supervisors run the operating sections of the department, two of which are development engineering sections based upon product lines, i.e., Spectroscopy (see Figure 5) and Chromatography (see Figure 6). The third, the Reliability Section, is chiefly responsible for representing and interpreting the points of view of the users of Perkin-Elmer's instruments to the other three sections. The fourth section is Product Design and Engineering Services, to which the Product Design, Drafting, Maintenance Engineering, Model Shop, Technical Writing and Reproduction Groups are assigned. (Maintenance Engineering is a separate function with the responsibility of maintaining and updating all released drawings, parts lists and assembly and test specifications to the latest manufacturing revisions.) The main objectives of this



FIGURE 1. View of the main plant and executive offices of the Perkin-Elmer Corporation at Norwalk, Connecticut.

fourth section are to provide the engineering supporting activities listed above at a minimum cost that is commensurate with standards for high quality, precision instruments. It also assumes as many routine engineering tasks as possible. In accomplishing these objectives, it frees engineers and scientists of routine engineering work and saves valuable engineering time.

THE JUNIOR DRAFTSMAN

AS our recently promoted junior draftsman assumes his new duties, he will be assigned to the Maintenance Engineering Group where he will become thoroughly grounded in the mechanics of our change notice system. He will incorporate approved changes on several types of drawings, will become familiar with simplified drafting techniques modified to suit our operation, and will be exposed to an optical tolerance system and a modified mechanical tolerance system; see below.

TYPES OF WORKING DRAWINGS

THERE ARE five general types of working drawings prepared by our draftsmen, as follows:

1. Conventional, "scaled" drawing. This is our standard drawing, produced to scale with instruments and templates, for relatively high-volume,

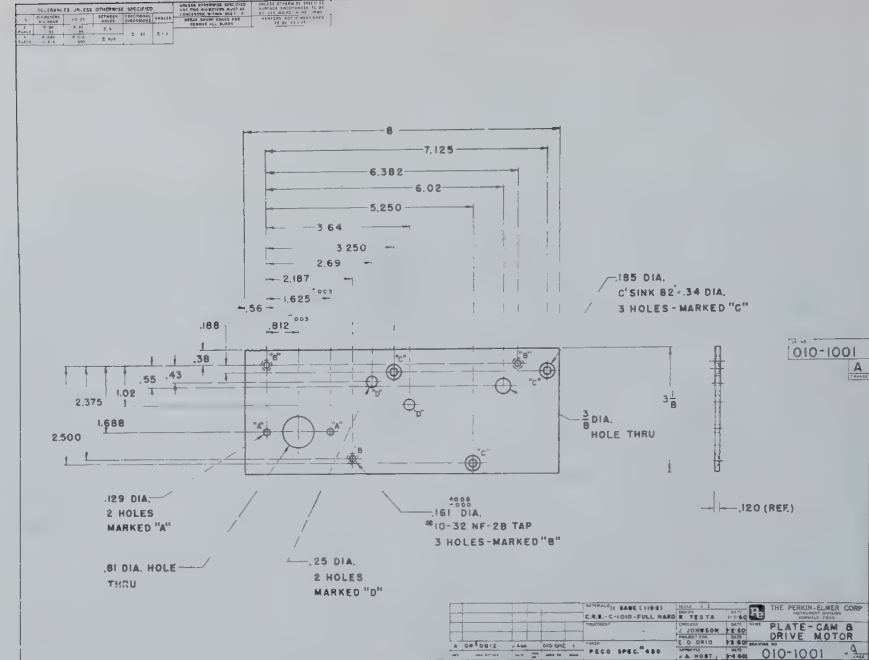


FIGURE 2. Drawing above uses conventional dimensioning system.

low-cost products. In addition, all design layouts and drawings for nameplates and panels are prepared in this manner, regardless of the type of project.

To reduce the cost of preparing this type of drawing, we have adopted simplified drafting techniques compatible with our operation. Since the Instrument Division does not manufacture all of the parts used in its products but relies upon many diverse vendors, it is difficult to deter-

mine who the users of a drawing will be at the time it is prepared.

It is our contention that simplified drafting, deviating radically from conventional drafting, is useful only when the eventual user has been educated to the new symbols and conventions. For example, proponents of simplified drafting (carried to radical extremes) recommend drawing only one quadrant in the end view of a symmetrical, circular part in the interest of minimizing drafting expense. The story is told of one company who did this, issued the drawing to one of their subcontractors, and were shipped several thousand quadrants. Unfortunately, the vendor interpreted the simplified drawing in a literal sense.

In contrast, an example of the simplified drafting system that we have adopted is shown in Figure 2 in comparison with a drawing prepared to conventional standards. Note that our presentation minimizes drawing effort but does not deviate too far from established conventions.

2. Freehand drawing. This is used to construct breadboards and pre-production prototypes, for some work within the Division, and for single-purpose, custom-built instruments and accessories.

3. Word drawing. This is the simplest type and is used whenever a brief word description can effectively eliminate a conventional drawing.

4. Photo-drawing. This type em-

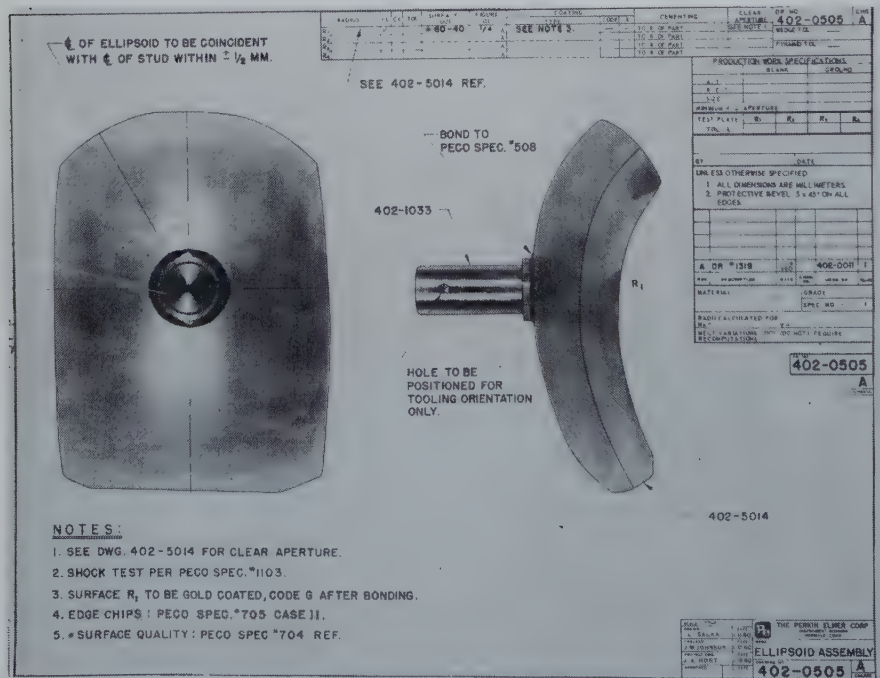


FIGURE 3. Drawing of an optical sub-assembly, in which photographic techniques are used. Results are good and drafting time is minimized.

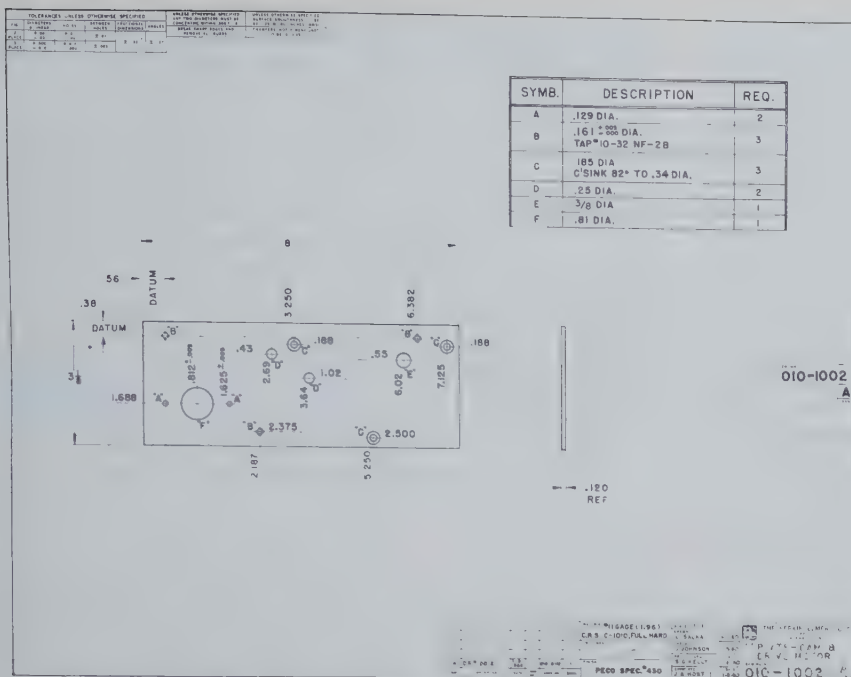


FIGURE 2 (RIGHT). The same part drawn to Instrument Division Standards.

employs photographic techniques and is being incorporated in our system more and more because of its many possibilities. Usually, in photodrafting a draftsman need only add call-outs, reference dimensions, pertinent notes and fill in the title block.

The optical sub-assembly shown in Figure 3 is one of several applications of this time-saving technique. In another application the photographic method is used to show the intricately shaped tubing, fittings, and commercial components used in a process chromatography instrument as seen in Figure 4.

5. Drawings employing time-saving devices. This, the broadest category, incorporates new technological advances and is being expanded constantly. Strictly speaking, photodrafting falls into this category but is identified separately because of its wide application in our system.

To eliminate time-consuming, extensive hand lettering, special typewriters and adhesive overlays are used with the obvious advantages of greater legibility and minimizing the time expended by draftsmen.

Other time-saving devices in this category which have been found useful are pre-cut, pressure-sensitive tape to represent conducting paths and pre-cut, pressure-sensitive circles to represent terminals on layouts for printed circuit boards. Also, depending upon the specific applications, full

use is made of reproducible intermediates, such as sepias, auto-positives, Vapo-Cloth and CB processes.

TOLERANCE SYSTEM

THE MECHANICAL tolerance system used on all Instrument Division drawings combines the main features of the unilateral and bilateral systems of tolerances. On holes and shafts, the unilateral system is used

because it permits changing the tolerances without affecting the minimum allowable clearance space between mating parts, i.e. the allowance. In other words, the tolerances can be changed without affecting the condition of tightest permissible fit. As a rule, in the bilateral system a change in tolerance also necessitates changing the nominal size dimension of one, or both, of the two mating parts. A further advantage of unilateral tolerances in such applications is that all of the benefits from the "maximum material" system of dimensioning are realized.

Bilateral tolerances are used on a dimension between holes because a variation in either direction is critical for interchangeable parts. The underlying principle in this case is that the nominal dimension establishes the location of the center line of a hole and bilateral tolerances (as opposed to unilateral tolerances) minimize the extent the target can be missed on either side of the centerline.

THE SENIOR DRAFTSMAN

AS THE proficiency of our junior draftsman grows, he advances to senior draftsman and his duties extend beyond the efficient preparation of accurate drawings of complex details from design layouts. One of his additional assignments will be to

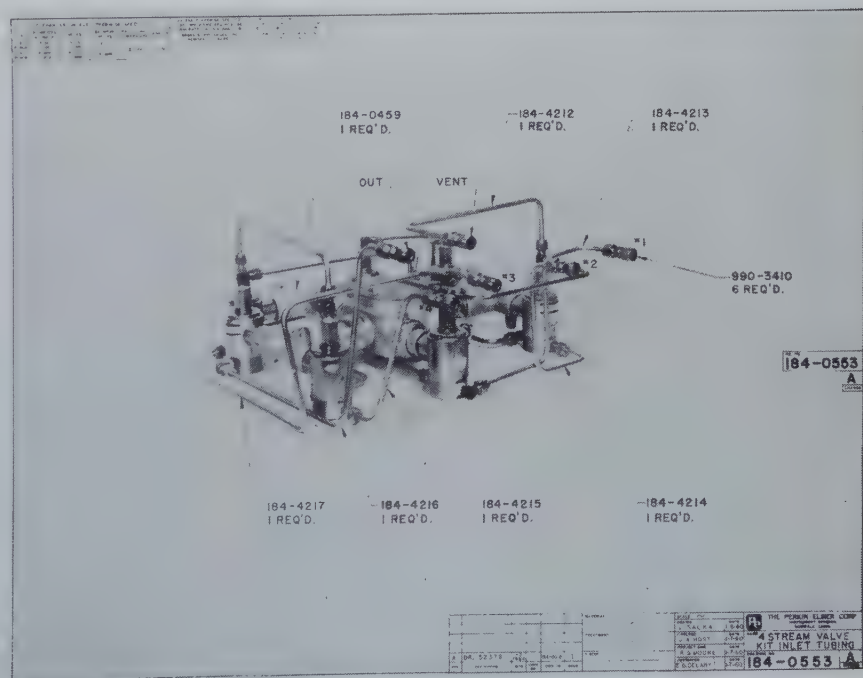


FIGURE 4. Drawing of a valve manifold sub-assembly in which photographic techniques provide optimum readability at minimum drafting expense.

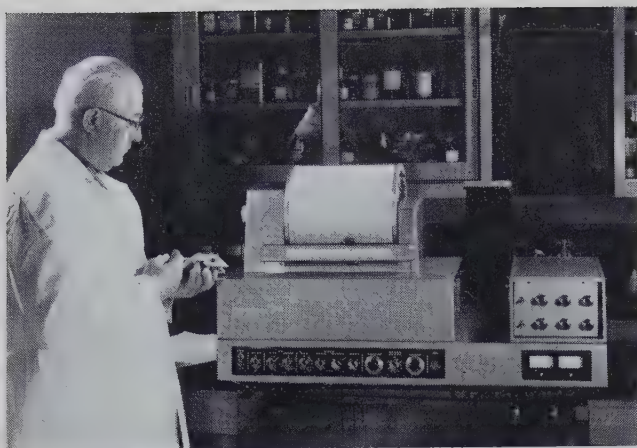


FIGURE 5. Spectroscopist uses Perkin-Elmer's Model 221 Spectrophotometer to analyze chemical compounds through measurement of their absorption of infrared radiation.

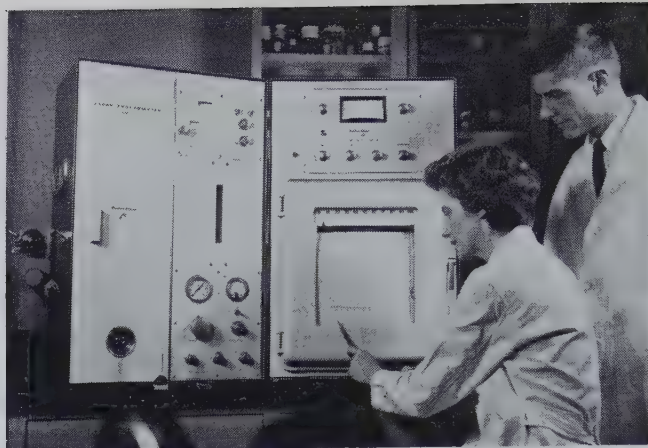


FIGURE 6. Chemists using the Perkin-Elmer Vapor Fractionator Model 154 to apply the analytical technique of gas chromatography for analysis of a chemical mixture.

lay out simple mechanisms and either to assemble, or to aid in assembling, them. In addition, he will be asked to work as an engineering aide to assist a project engineer in calibrating and obtaining evaluation data on our chromatographic or spectroscopic instruments (see Figure 7).

It has been our experience that the inclusion of additional assignments in the senior draftsman's duties is mutually beneficial to the individual and to management. In performing these duties, the draftsman develops enthusiasm for his job as he observes the immediate results of his direct contributions to the progress of the project. At the same time, he broadens his education and experience through exposure to some of the subtle systems aspects of instrumentation. When a senior draftsman is ultimately promoted to the Product Design Group, management benefits by obtaining a designer already familiar with the general problems in the relatively new field of optical instrumentation. Or, as in the case of one of our senior men several months ago, the draftsman could become a development engineer with more than the usual junior engineer's background in optical instrumentation. This man, who was about to receive his engineering degree from the evening division of a local university, was promoted directly to the Spectroscopy Section as a mechanical engineer.

Assuming that a draftsman advances into the Product Design Group, he will be assigned to the design leader of a project team who will provide his technical direction. Additional members of the project team

may include the project engineer and other engineers, product designers, draftsmen, mechanical and electronic technicians, technical writers and technical illustrators, as required. The project engineer is responsible for the overall technical direction and execution of the project while the design leader is responsible for the mechanical aspects of the project and for the transfer of specific technical information (i.e., assembly and detail drawings, assembly parts lists, etc.) to the Manufacturing Department.

One of the first instructions a new product designer will receive from the Chief Designer is never to incorporate in his design a suggestion or recommendation that he feels violates sound design practice, regardless of the source. Quite the contrary, all product designers are encouraged to advance their own ideas and, in the event of a technical stalemate between the designer and any other individual assigned to the project, a procedure has been established to bring the disagreement to the attention of cognizant supervisors. Since this procedure was written into the Product Design objectives three years ago, it has gained unanimous acceptance. Less than a half-dozen cases have had to be arbitrarily settled during this period.

THE PRODUCT DESIGNER

IN OVERCOMING specific technical problems, the product designer can call upon a wide range of skills distributed among a number of specialists within the Product Design and Engineering Services Section. For example, in the field of instrumenta-

tion he will often be confronted with the unusual problem of having to design a dial or scale for purposes of readout or calibration. Such a dial may vary in complexity from a simple linear calibration to a logarithmic spiral.

In the interests of economy and of minimizing the lead times required by external sources, it is frequently decided to produce the dial, on a short run basis, within our own facilities. In these instances, all of the required work can be accomplished within the Product Design and Engineering Services Section. Technical illustrators, reporting to the supervisor of technical writing, furnish the necessary artwork. Required photographic work or fabrication is accomplished, on a part-time basis, by a mechanical technician in the model shop who has an interest and demonstrated skill in photography (see Figure 8).

All photographic work is scheduled through the model shop supervisor who directs the activities within the photographic facility. He is also responsible for keeping abreast of pertinent new developments in photography and for the procurement of photographic equipment that will increase the efficiency and versatility of the photographic operation.

Other parts which the product designer may be called upon to design and to have produced within our facilities include rigid plates giving important instructions to the user, nameplates, labels for diverse purposes (see Figure 9), and an infinite variety of formats for chart paper presentations.

As a member of a specific project

team, our new product designer accompanies the project engineer and lead designer to scheduled Methodizing Meetings with representatives of the Manufacturing Department. These meetings are scheduled for those projects which will be released to Manufacturing and have been proven technically feasible in Engineering by the construction and evaluation of a breadboard or pre-production prototype. Here, all aspects of design are discussed prior to the release of final drawings to Manufacturing. The following benefits are realized from these meetings:

1. Representatives of Manufacturing are familiarized with all new designs in advance of the final releases from Engineering.
2. Manufacturing people are given the opportunity to criticize and evaluate new designs with regard to such aspects as materials selection, tolerances, difficult-to-machine geometrical forms, and costly capital equipment requirements; and
3. The number of change notices for new designs is reduced markedly following the first production run in Manufacturing.

DESIGN LEADER

AS A PRODUCT DESIGNER becomes more experienced, his responsibilities increase to those of design

leader on any specific projects assigned to him. In the Instrument Division, the term design leader is a functional title rather than a specific job classification. It designates a designer assigned to a specific project in the Engineering Department who will have the functions of lead designer and who will work closely with a development engineer assigned as project engineer. The design leader will take an active part in the planning, administration and supervision of his project. He will plan and schedule the manpower and work loads for the mechanical aspects of the project and will help to prepare formal estimates for engineering management of the design and drafting times required. He will supervise the work of the product designers and draftsmen assigned to his project and will maintain liaison with industrial designers responsible for styling. In addition, he will discuss technical problems with vendors and sub-contractors who may be asked to supply various components. He will attend periodic Project Review Meetings in which the status of his project is reviewed with engineering management and will also attend Methodizing Meetings. And, when the project is finished, he will summarize the activities of Product Design in a final report on the project which will include a comparison between the actual design and drafting time expended and the estimated time, and

an analysis of the factors contributing to any severe discrepancy.

THE DESIGN ENGINEER

AS HIS experience continues to broaden in the field of instrumentation, a product designer with the prescribed educational background will advance to the position of design engineer. The projects assigned to a design engineer often place him in the dual role of project engineer and design leader, particularly where either mechanical component development or special purpose mechanical systems are involved.

For instance, when a mechanical component required in relatively large quantities is unavailable because commercial products do not measure up to specification, are found to be economically prohibitive, or lack the refinements associated with precision instruments of high quality, a development program is authorized by engineering management. Such a program is assigned to a design engineer to broaden his experience in the area of project management and to prevent duplication of effort and reinvention by development engineers who may require the same component for different projects. Typical results of such projects are the mechanical components shown in Figure 10.

The other type of project assigned to design engineers is also primarily



FIGURE 7. Senior draftsman working in laboratory as an engineering aide on Model 4000A Ultraviolet Spectrophotometer.

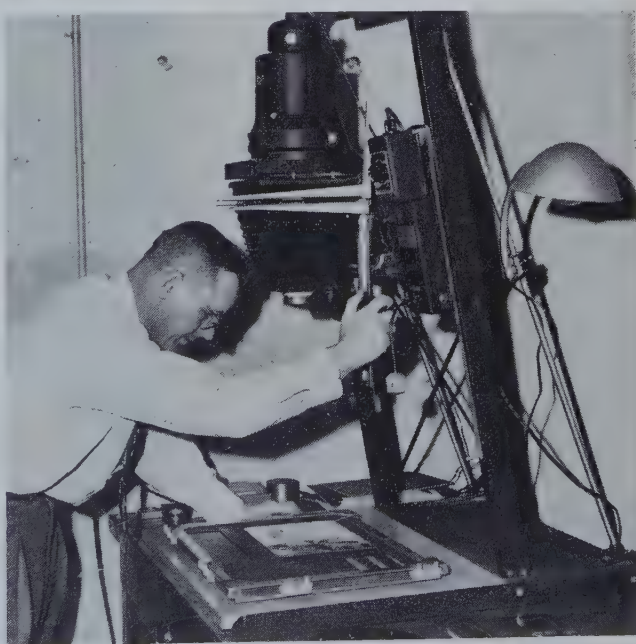


FIGURE 8. Mechanical technician with demonstrated skill in photography does part-time work in Model Shop.

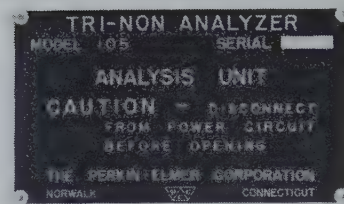
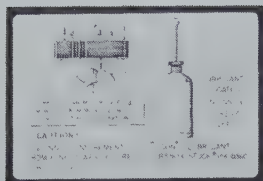


FIGURE 9. Examples of limited quantity parts produced by photographic methods in Product Design and Engineering Services.

mechanical in nature, and is generally designed and built to specifications supplied by a specific customer on a limited quantity basis. This type of project is shown in Figure 11.

ADDITIONAL OPPORTUNITIES

THE Product Design and Engineering Services Section—charged with responsibility for meeting the requirements of the Instrument Division—has been encouraged to contribute, innovate and experiment in order to establish a system which provides maximum benefit to both company and worker. In tracing a man's progress from a start in the Reproduction Group, through

the Drafting Group, to design engineer, the scope of this system has been outlined. However, the scope extends beyond the Product Design and Engineering Services Section into other areas.

Recently, a technically qualified design engineer accepted an invitation to transfer into the Instrument Division Research Department. In so doing, he filled a need for talent competent in instrument technology and capable of translating advanced mechanical concepts into drawings to be used by technicians and model-makers. Moreover, his transfer gave testimony to the success of a system in which the drafting department is used to provide much more than

drawings for the Company's products—it also develops and supplies manpower to meet the need for technically trained personnel in the relatively new field of instrumentation.

The Author

RALPH F. SCALO is Section Supervisor, Product Design and Engineering Services, Instrument Division, Perkin-Elmer Corp., Norwalk, Conn. He joined the company in 1951 as a junior engineer, and in 1954 was promoted to design engineer. During the same year he became a project engineer, and in 1955 he became Section Supervisor of Product Design.



FIGURE 10. Examples of mechanical components designed and developed by design engineers in the dual role of design leader and project engineer at P&E.

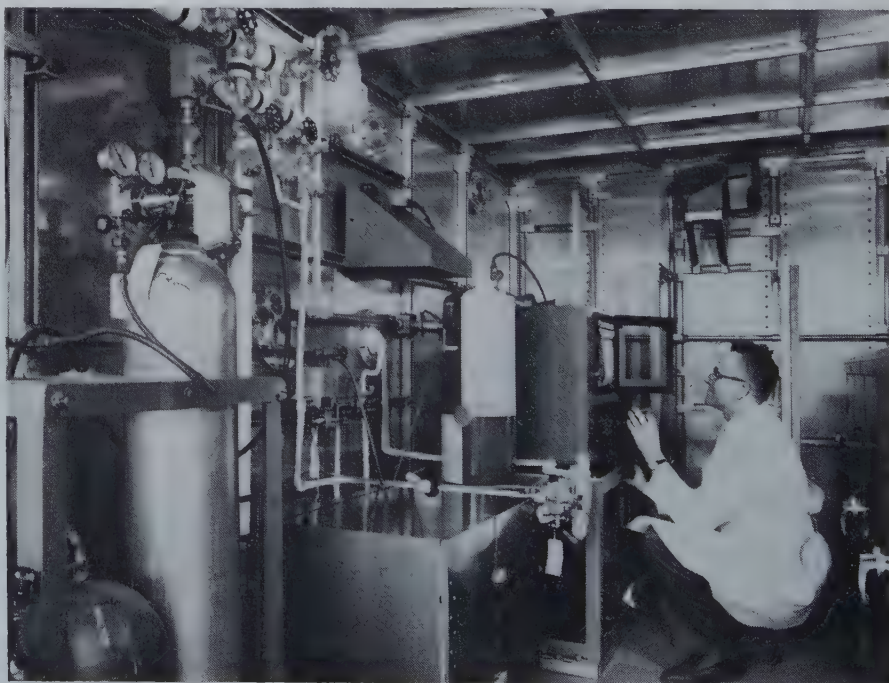


FIGURE 11. A design engineer calibrating a Perkin-Elmer Model 184 Process Chromatography instrument in his portable systems test unit for the petrochemical industry.

Architectural Graphic Standards

The Birth of a Book

by Harold R. Sleeper

Editor's Note: The book, "Architectural Graphic Standards," by Charles G. Ramsey and Harold R. Sleeper was the first graphic volume of "standards" for use by the architectural profession. When the original edition appeared in 1932, the "graphic" method chosen to present data, standards, and information was a novelty in publishing. We are pleased to be able to present in GRAPHIC SCIENCE a first-hand account, by one of the authors, of how this history-making volume was compiled.

THIS BOOK had a lowly beginning. Published first in the depths of the Great Depression, it was needed by no one, as scarcely anyone in the building field was busy. Ramsey and I couldn't live on the royalties even when architects were existing on salaries of fifteen dollars a week for doing subsidized "made work." Our best salesmen were a few architects and friends who, convinced of its worth, peddled the book to builders, job-to-job.

Over the years, sales have increased steadily and each new edition has grown in size. The success of this book—now commonly referred to as the "Architects' Bible"—is, we are convinced, due to the fact that it is as nearly one-hundred-per cent "graphic" as a book could be. We were pioneers when we started ARCHITECTURAL GRAPHIC STANDARDS back in 1930, for prior to this time technical handbooks were generally made up of fine print, bound in stocky but small volumes.

THE GREAT DEPRESSION

GOING BACK to the state of affairs in the Depression, Ramsey and I were growing restless. Prior to this time, neither of us had ever had a day without work, and now our office was completely dead. Our senior associate, Frederick L. Ackerman, wished to hold the office together. Should we, too, jump on the architects' dole, or make our own work? If we could, we might outlast this ordeal. Ackerman encouraged us.

It occurred to us that we might augment the three or four office standard sheets—something many offices have in mind, but never have time to do. I remember these sheets vividly: they were all graphic! Two of them showed sizes of athletic sports fields; two showed the various types and sizes of college dormitory bedrooms. One sheet showed the comparative depths required for the various floor finishes. We had done this type of work. We even thought of the next three or four sheets needed.

As we proceeded with our drawings, we felt surely that if we needed such graphic sheets in our office, other offices might need them just as much. Why not make these into a small book?

Ramsey already had published a graphic book for use at Mechanics' Institute for instruction in drawing. So he had contacts with John Wiley & Sons, the publisher.

Wiley said they might be interested, although it was hard to see any market ahead. Even to consider

a book, they said, we must draw up a few more sheets and prepare an outline of the volume, giving them full details.

The outline, with all the time in the world for us to prepare it in, turned out to be a hefty brochure, telling everything about the purpose of the book, its market, size, suggested titles, sources, and subjects to be covered. We were on our way!

DRAWING VS. THE PRINTED WORD

PRIOR TO THIS we had discussed whether any text should be included. Books without text were few. We realized that architects, engineers and draftsmen like to draw, or they would never have been attracted to their respective fields. They like to read drawings. Their trained eyes can see and comprehend a page of drawing much faster than they can comprehend a page of printed words. They enjoy looking at drawings much more than they enjoy reading.

We realized that a page of drawing may be comprehended at a glance; we also knew that the time necessary to make a drawing is much longer than that required to write a page of printed matter. In 1930, however, architects had more time than anything else, so we were able to solve that problem without debate! As a matter of fact, what we wanted to illustrate in this book could not be explained otherwise—at least not so that those used to drawings would bother to read it.

I had had experience with Dean Martin's (Cornell) *Details*. This was

ment was to measure a tall mounted cop on a large horse. He found his quarry at the corner of Fifth Avenue and 45th Street. On his return he said he had found just what was ordered—a huge horse and a large officer—but the cop had to be convinced that this wasn't a gag. He was finally sold. "Not here," he said "Meet me down at Sixth Avenue." So there the data was secured clandestinely.

Just the two of us did all the work for the First Edition, from preface to index.

Through the four later editions we held firmly to our original idea of keeping the book graphic. Today, very few original pages remain, and these have been corrected. In the last edition, vari-typing was used instead of lettering. Hand-lettering has become virtually a lost art since Charlie Ramsey gave it up!

THE SEQUEL

ARCHITECTURAL GRAPHIC STANDARDS became larger and larger. And so, before the Fifth Edition, I decided that a companion volume

would be needed to cover the mass of newly available data.

It was decided that this new book, BUILDING PLANNING AND DESIGN STANDARDS, would contain material relative to specific building types. The baby had become twins! The original volume then, contains general data applicable to any type of structure, while its twin also graphic-relates to specific building types.

SUMMARY

THOUGH PRIMARILY designed for those in the construction industry, ARCHITECTURAL GRAPHIC STANDARDS is today being used by students and laymen alike. This shows that drawings have a very wide appeal.

Since our start in using "graphics" in the construction field, way back in 1930, many types of literature have turned to the same media. Picture-book magazines, teaching with pictures and drawings, visual aids, manuals for the care of equipment—all have made their appearance. We can truly call this the Graphic Century!

The Author

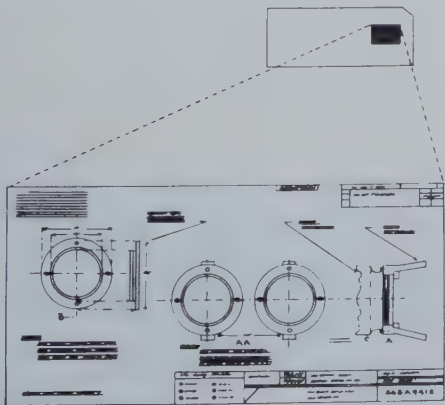
HAROLD R. SLEEPER, author of the foregoing article on ARCHITECTURAL GRAPHIC STANDARDS, is a Fellow of the American Institute of Architects. He is a member of numerous other architectural societies, among these, the Architectural League of New York, the New York State Association of Architects, Architects' Council of New York City, Construction Specifications Institute, and the Building Research Institute.

Active as architectural juror and professional advisor, he has contributed articles on building and planning to many architectural magazines.

In addition to ARCHITECTURAL GRAPHIC STANDARDS and its companion volume, BUILDING, PLANNING & DESIGN STANDARDS, his published books include ARCHITECTURAL SPECIFICATIONS, 1940; A GUIDE TO STANDARD SPECIFICATIONS FOR GOVERNMENT BUILDING, 1942; and A REALISTIC APPROACH TO PRIVATE INVESTMENT IN URBAN REDEVELOPMENT, 1945.

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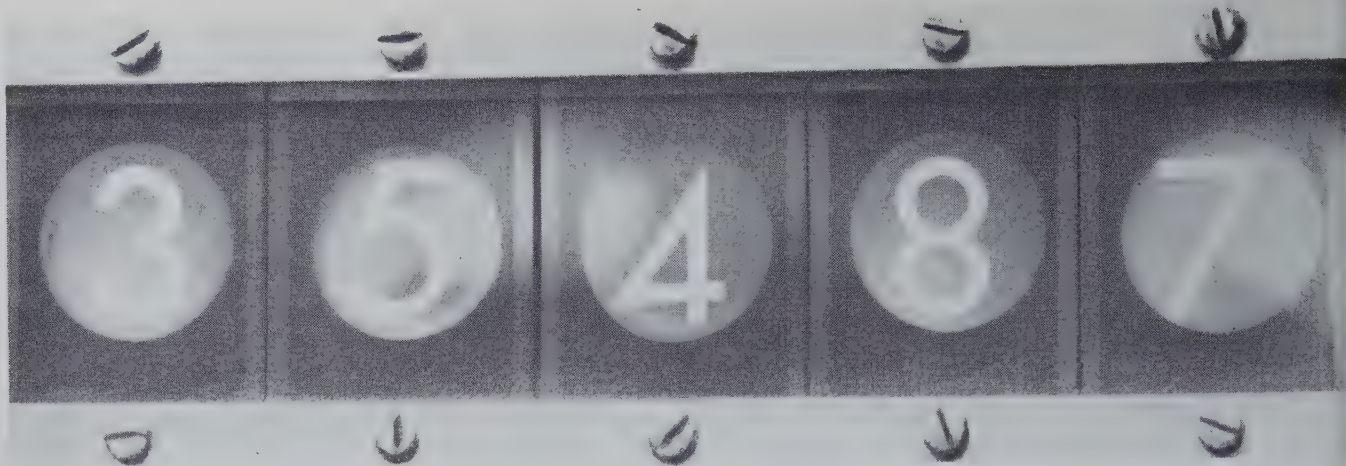
ANKEN FILM COMPANY

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Newton

New Jersey





An Automated Coordinatograph

An instrument first used in laying out maps and watch parts, then printed circuits and other precision work, now finds X and Y points from punched tape or cards

A 100-YEAR-OLD TOOL whose importance in design and drafting is still being explored and whose uses seem to be restricted only by industry's imagination is being automated. The announcement by Aero Service Corp., Philadelphia 20, Pa., of an automated coordinatograph available for general distribution is being made at the 26th Annual Meeting of the American Society of Photogrammetry being held March 23-26 in Washington. The instrument will also be shown at the ASTE Tool Show in Detroit April 21 through 28.

The technical development of the automatic coordinate plotter was carried out by Aero Service, one of the nation's leading aerial photography and map-making firms, working in conjunction with Franklin Institute, also of Philadelphia.

Essentially, a coordinatograph is a precision plotting instrument which permits precision layout of grid systems and coordinate positions. It is currently being used in American in-

dustry for precision layout of templates, comparator charts, and as a checking tool for templets, designs, and parts.

In recent years, the scope of the applications to which the coordinatograph has been put is extensive. In turbine blade design and testing, model profiles of steam turbine blades are placed in an electrolytic tank equipped with a coordinatograph. The instrument precisely positions the potentiometer probe which is used to define the flow patterns. Points along the curve of the jet turbine blade are plotted as close as a few thousandths of an inch, and then splined in.

The aircraft industry has found coordinatographs useful in scribing and drawing grids on metal or stable drafting material, and also in plotting precise coordinate positions.

Lofting, model shop and tooling de-

partments have also used the device in checking profiles.

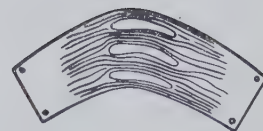
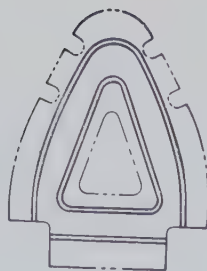
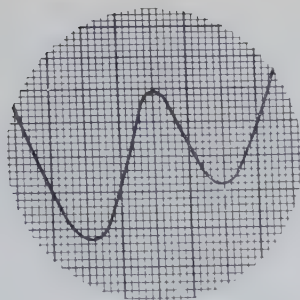
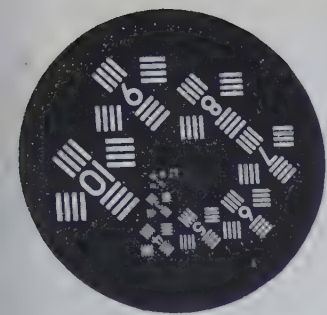
Coordinatographs are employed as a checking tool (instead of a jig boring machine) to measure completed layouts or finished etched circuits in printed circuit work. The instrument can also be used for the art work layout in the precise location of the lands. Grid patterns can be exactly scribed or drawn at the usual 4:1 scale.¹

The instrument has also been found useful in preparing enlargements of drawings for tool making, and can be equipped with a diamond-tipped scribe point for plotting on glass.

The coordinatograph itself, is, made in Switzerland, by Haag-Streit, Ltd., and has been used by Swiss watch manufacturers for making control and reference drawings. Aero Service and other map making organizations use the coordinatograph for precision plotting of map grids and control points.

It is in this broad context that Aero Service Corporation's announcement assumes meaning for drafting depart-

1. Editor's Note: A description of the use of a coordinatograph in printed circuitry layout was contained in the article, "Printed Circuit Masters," GRAPHIC SCIENCE, October, 1959, page 16.



ments. For the combination of numerical control techniques and the accuracy of the coordinatograph opens up numerous additional applications, and will speed up many layout operations.

The numerical control of the instrument will make possible automatically-programmed plotting to any practical degree of accuracy. The accuracy (0.0015) will probably be limited more by the surface plotting material used than by the instrument.

NUMERICAL CONTROL

IN BRIEF, the automatic, numerical control attachment will operate as follows. X and Y coordinates and commands will be entered on punched tapes or cards. A Flexowriter will serve the functions of input and output as well as tape preparation and verification.

Output data in the form of X and Y coordinates of the points measured will be obtained when the operator positions the microscope using jog controls. To make this measuring operation more efficient a self-illuminated microscope is available. As a more sophisticated method of reading X and Y coordinate positions, a closed

circuit television camera may be employed.

With this arrangement, the user may work from a seated position, rapidly determining the coordinates of the points and printing or punching the tabulation.

One of the features of the unit is a light bank of figures, to indicate continuously the coordinate position of the microscope crosshairs. Reference of the coordinates may be established with respect to any point on the table.

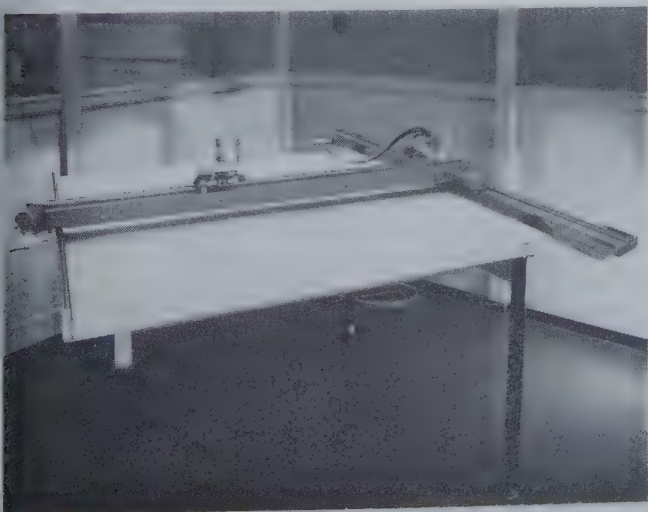
The system used for the plotting of X-Y information with the Haag-Streit coordinatograph is a "static" system, whose function is to plot points from programmed X-Y information and to draw straight lines parallel to the coordinate axes. The plotting area of the automated model is 47¼-by-47¼-inches.

The automated unit, in addition to the square table, has two console components: one contains the electronic components, and the second, the Flexowriter, a writing desk and storage cabinet. The Flexowriter provides four necessary components: a keyboard and punch to prepare the tape for automatic plotting and for record-

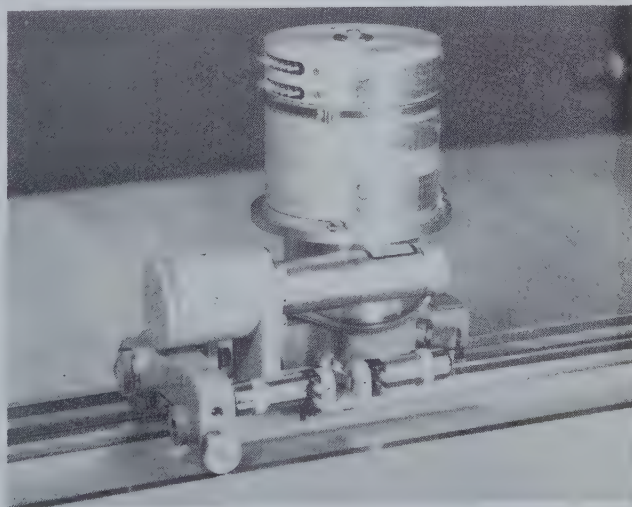
ing of coordinate locations under manual operation; a tape reader to enter the information for automatic plotting; an electric typer to give a printed record of manually located points; and a verification of tape punching. Cost: around \$35,000.

Aero Service—the exclusive American distributor for the small Swiss firm which makes the basic unit—claims for itself the distinction of being the largest company in the world engaged in airborne geophysics, geodesy, photogrammetry, photo interpretation, topographic mapping, and related activities. It is also the oldest flying corporation in the world.

Haag - Streit, the Swiss manufacturer is a small firm that has been in existence since 1858. According to that company's records, an order for one large co-ordinate machine with case and board was placed the 15th of January 1867. The firm, which has survived two wars, and their related economic ups and downs, now employs some 100 persons, most of them craftsmen who were born and live in the small town of Liebefeld - Bern, Switzerland.



OVERALL VIEW of the automated Haag-Streit Coordinatograph showing encoders, driver motor, and plotting surface.



CLOSE-UP of the encoder (mounted on movable Y rail carriage) also shows motor and locking device.

Operations and Procedures for Engineering and Drafting Supervisors

How to Train, Upgrade, and Supervise Your Supervisors

by George C. Schmidt

TRAINING is building men—not just a good output record. Set up a training target.

1. Plan What to teach.

Attitudes: Help the supervisor develop a positive, enthusiastic attitude towards his job, his company, his products, his fellow employees. Develop his willingness to go out of the way to cooperate.

Knowledge. Expect a thorough knowledge of all machines, materials, methods, and jobs in his department. Train him to impart knowledge, manage his department, make decisions, and accept and carry out responsibility.

Skills. Help him develop skills in dealing with people, skills in planning the work, in meeting difficulties, in expediting production, in developing methods.

Work Habits. Guide him in developing work habits of self discipline and self improvement; help him organize use of his productive time; develop habits of teamwork with the rest of the organization.

2. Plan how to teach.

In “small doses”—don’t cram too much at once.

With semi-formal “training classes”—once a week, one hour or so.

With informal “morning bull sessions”—10 minutes a day.

With personal coaching—individual conferences on problems.

Work with a definite training or probation period.

3. Set up a definite program.

Sell the importance and opportunity of the job at the beginning; show him how he can make and see progress.

Plan definite training “methods”; good teaching means thorough explanation, demonstration, check and question each step.

Plan to follow through to see if he is making the grade. Allow for additional coaching to re-explain and correct errors.

4. Provide incentives to stimulate learning and better supervisory performance.

HOW TO SUPERVISE YOUR SUPERVISORS

SET STANDARDS for supervisory job performance. Develop a checklist or merit-rating sheet to rate your supervisors’ performance, either on the basis of a job analysis of all the factors of his job, or on the basis of key elements of results.

1. Explain carefully any new policies or programs. Be sure he understands and is enthusiastic. Question and check his understanding. Maintain enough personal contact with him to be close to what he is really thinking and feeling about things in the organization.

2. Provide incentives and encouragement. Try an occasional contest or competitive device, but be sure to equalize all the factors in the situation for fairness like any good handicapper. Provide that necessary pat on the back for good work and conscientious efforts.

3. Give him support. Feed him new ideas, new methods, management thinking. Back him up with good engineering, good equipment, good sources of raw materials, as good workers as can be hired. Provide him with a basically sound “deal” in which to operate.

4. Test performance on production. Give him a goal or quota to shoot at

and make it one he can accomplish with the men and machines at his command, or surpass with a little extra effort.

5. Test performance on costs. Keep records of production, overtime work needed, development and design work, revisions and other key cost factors. Show him the facts so that he can spot the weak points in his performance.

6. Follow up personally. Go out into the department with him and help him with specific job problems. Take time to have individual personal “counseling” interviews with each supervisor periodically to check over individual problems they may have.

7. Show him his progress. Let him see it in terms of increased earnings.

8. Be alert to his attitudes and habits while upgrading his job knowledge and job skills as a supervisor. The “best” supervisor may possess only mediocre “ability” but a terrific attitude.

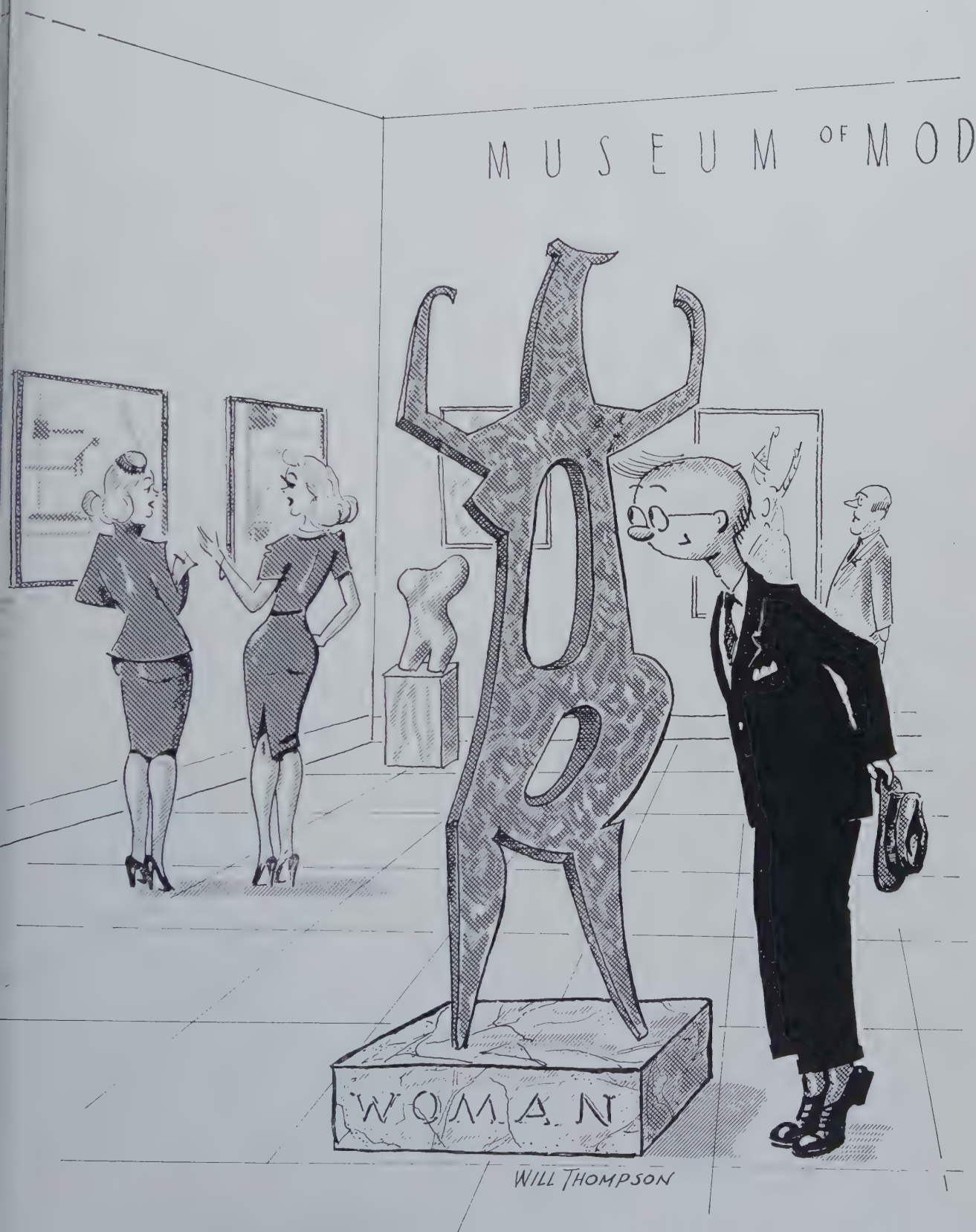
9. Your supervisor is important. Let him know that he, personally, is more important to you as a man than the production he is responsible for. Good supervisory leadership can make production almost automatic.

10. Give him responsibility, and authority to go with it. Any man who is willing to assume full responsibility for an operation needs full authority to handle the problems connected with it. If he prefers to depend on others, he may simply feel he hasn’t the authority to do a good job and can’t accept the responsibility.

FOURTEEN POINTS TO GUIDE SUPERVISORS

THE FOLLOWING points are adopted from Kermit Fischer’s code of

George C. Schmidt’s article—begun in the December 1959 issue of GRAPHIC SCIENCE, and concluded above—is based on a paper he delivered at the Engineering and Drafting Management Institute, Madison, Wis., October 1959.



conduct for executives, as it appears in Fischer & Porter Company's *Handbook for Members of the Organization*.

1. Give credit for accomplishment to others freely, quickly, openly and unsolicited. Doing the opposite, taking for yourself credit which belongs to those under you, is a dishonorable act which will destroy your store of good will and your ability to function as a supervisor.

2. Control your temper. You must be able to discuss any problem or situation quietly and reasonably, regardless of provocations you may have to endure. A supervisor should be in control of his thoughts and tongue at all times. To be a supervisor a man must first give up the right to be angry.

3. Avoid sarcasm toward anyone and anything. Also, avoid the joke with a sting or a double meaning. If such a joke is too good to be passed up, then be sure you have left in no one's mind a doubt as to the harmlessness of your intentions.

4. Be courteous, I don't mean the "proper" type of courtesy, but real consideration of other people's wishes, situations and feelings.

5. Be tolerant of a person's race, color, accent, conformity, habits and faults.

6. Be prompt. If you can't keep your appointments you will soon be a clog in the gears.

7. If you must be conceited, keep it a deep, dark secret all your own. Arrogance or complacency can neither be accepted nor tolerated.

8. Do not tamper with the truth. Every statement must stand scrutiny and every promise must be vigorously fulfilled.

9. Let others—particularly your subordinates—talk themselves out, even if it takes an hour of patient listening until they reach the real core of a problem. If you have dominated a conversation (instead of merely guiding it), you have probably done a poor supervisory job.

10. Express yourself concisely, clearly, and completely, particularly when giving instructions.

11. Eliminate dirty language and avoid swearing. Even slang terms lead to looseness of expression and misunderstanding. Benjamin Franklin and Winston Churchill could verbally demolish an opponent without a single slang expression.

12. Be sure you like your work. Of

course you should have plenty of outside hobbies and interests; but if you find it hard to come in on Saturdays or to stay during the evenings when it becomes necessary, then you probably either need a rest or a different company with which to work.

13. Be considerate of the people you supervise.

14. If you haven't figured out yet the size of a man's car or home, the affluence of his friends, the number of his clubs, the price of his wife's fur coat, and the title on his office door have nothing to do with his intrinsic worth, and if these things mean more to you than the job quietly done well and the wisdom and spirituality acquired, then you don't belong here.

MANAGEMENT SKILLS AND KNOWLEDGE FOR THE SUPERVISOR

THE FOLLOWING is a representative listing of management skills and knowledge, not necessarily complete or in any order of importance.

Management Skills should include:

Expressing problems clearly
Guiding by questioning
Leading and arbitrating discussions
Coaching subordinates
Reaching decisions
Asking intelligent, searching questions that stimulate, spur and encourage thinking and work
Communicating with superiors
Communicating with subordinates
Delegating responsibility
Understanding and appreciating human relationships
High standards of integrity and honor
Long-range planning
Organizing
Establishing controls for follow-up
Setting standards of performance
Evaluating performance of individuals
Evaluating performance of a unit
Maintaining morale
Taking disciplinary action
Sympathetic and friendly, liking both people and ideas
Able to relate cooperatively and stimulatingly with subordinates
Patient, tolerant, and extremely flexible in both thinking and acting
Selling ideas
Negotiating
Investigating
Analyzing and interpreting accounting and statistical reports
Cost control

Report writing
Letter writing
Dictating letters
Public speaking
Interviewing
Meeting people
Conducting job performance reviews and counseling subordinates
Reading improvement
Developing budgets
Making complex information meaningful
Having a broad intellectual outlook
Preparing and presenting accounting and statistical data
Planning and scheduling the flow of work
Eliminating unnecessary operations
Directing work operations
Coordinating the activities of related units

Management knowledge should include:

Specific technical knowledge and competence
Practical business economics
Company objectives
Departmental objectives
Job evaluation
Safety
Labor relations and labor laws
Employee benefits and privileges
Principles of organization
Company organization
Personnel policies and procedures
Competitive practices
Attention to the public interest

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Achieving Administrative Competence, University of Washington, Seattle, Washington.

The Author

GEORGE C. SCHMIDT is Chief Draftsman, Campbell Soup Company, Camden, N. J.

Remote Reproduction

Drawings can now be transmitted by telegraph to and from New York, Washington, Chicago, Los Angeles and San Francisco

TRANSCONTINENTAL facsimile service for the use of public and private users—including design and drafting departments—now makes it possible to send and receive copies of drawings, blueprints, sketches and typewritten data sheets between Western Union offices in five major cities.

Western Union Wirefax circuits will “carry” a single page of copy coast-to-coast in about five minutes. Material to be transmitted can be drawn (in ink or pencil), typed, printed, or otherwise duplicated (by xerography, dark-dye diazo and similar techniques). A special adjustment makes it possible to send blueprints or other white line copy.

Medium should be white (preferably opaque) paper of standard 8½-by-11-inch size. In addition to the size restriction, there are also limitations regarding use of film or other transparent media because of the type of transmitting equipment used.

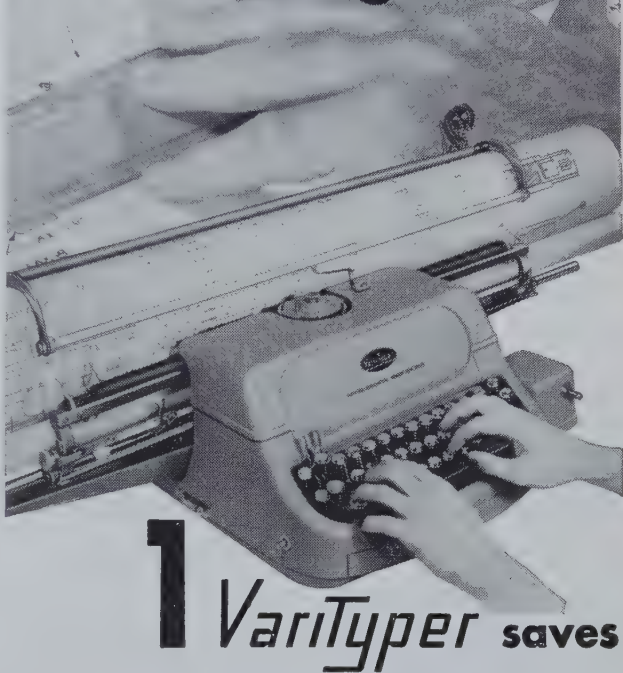
How It Works

AS CURRENTLY SET UP, the Wirefax facsimile service works as follows: W.U.’s delivery service in one of the five cities would pick up copy from the drafting or design department, or blue print shop and carry copy to the Western Union office. There, the copy to be transmitted is placed on a facsimile transmitting drum which, at the push of a button, revolves at 180 revolutions per minute. As the drum revolves, an “electric eye” scans material at 1.8 vertical inches per minute. An identical copy of this “read” material is received instantaneously at the destina-



OPERATOR prepares to transmit a document on Facsimile transmitter. Material can be sent coast-to-coast in about five minutes. A facsimile transceiver on which material is received on the left, is picking up material in the form of an exact “picture” of the original.

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This copy, for example, was prepared on a VARITYPER (Model 610). The Headlines were photo-composed on the HEADLINER.

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POINT**

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ON LEFT, engraving of original drawings and printed matter; on the right, engraving of the transmitted material. Some loss of detail can be detected. Transmitted copy has a pale green background; copy is black.

tion city where the receiving machine ejects an exact facsimile of the original.

A second copy can be produced economically by merely sending twice. To obtain multiple copies at the receiving end (Western Union will deliver from its destination city office to the specific address) the special electrically sensitive recording paper developed by Western Union can be xerographically duplicated, photographed, or even used as an offset master.

The quality of the transmitted copy is not as good as that of the original: in fact, a certain amount of detail will be lost, particularly where lettering is too small (see illustration), but the system seems to open up vast possibilities for firms who must get copy to or from these five metropolitan areas in a hurry.

Charges for transmission of a minimum size drawing may vary (depending on the cities involved) from \$2.00 to \$8.00. Additional information regarding Wirefax facilities can be obtained from the Western Union Telegraph Co., 60 Hudson St., New York 13, N. Y.

OTHER ASPECTS

ANNOUNCEMENT of the Wirefax Circuits is actually a recent development primarily designed to determine the extent of present demands for this type of remote reproduction service. Systems similar to Wirefax (called Intrafax) have been in use by some 325 companies for a number of years.

Initially, Western Union patented and placed into widespread use, compact desk-size facsimile machines which permit in-plant transmission of written messages to local telegraph offices. Next step was to set up a leased facsimile service for in-company communication between plants.

One of the half-dozen types of facsimile systems of this nature the firm has devised is a recently perfected network designed to provide the U. S. Air Force Strategic Air Command with high-altitude weather maps.

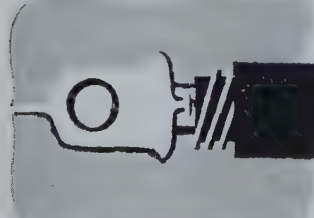
This system, known as the Strategic Facsimile Network, links some 57 U. S. Air Force Air Weather Service (AWS) weather stations at Air Force bases throughout the United States. This system makes it possible for up-to-the-minute weather maps to be transmitted immediately to air operations centers of the Strategic Air Command. System now in use enables charts and maps 18-by-36-inches to be transmitted within thirty minutes.



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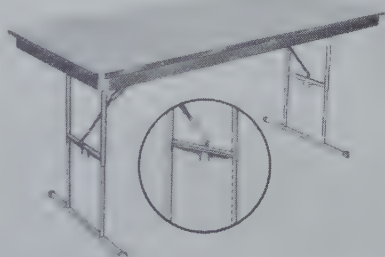
Sole Distributors:

USA: JOHN HENSCHEL & CO., INC., New York

New Products

Projection Emulsion

A slow-speed projection emulsion designed for microfilm enlargements, template reproduction and similar applications is now available on a variety of base stocks including cloth, vellum, and on both 55 gram, 003-inch 100-per-cent rag stock and on 85 gram, .004-inch, alpha sulfite paper, according to an announcement from Peerless Photo Products, Inc., Shoreham, L. I., New York. The emulsion has a sensitivity level such that it can be only safely handled under Series OA yellow safelights. Coated on .003-inch rag stock, the emulsion is reported to provide an intermediate base of relatively high translucency. Coated on .004-inch alpha sulfite base, the emulsion offers a general purpose base which can be used for making working prints and as an intermediate when fast printing speed is not essential or where fast diazo or blueprint paper will be used.



Adjustable, Folding Table

Tables, adjustable in height to more than 30 inches, are suitable for a variety of uses where people stand while they work, including drafting rooms. Introduced by Foldcraft Co., Mendota, Minn., the tables may be adjusted from 30 to 40-inches in height, at one-inch intervals. Each table has a spring-operated control for raising and lowering. Locking toggles keep the folding-leg mechanism secure. These tables are available with a choice of tops: sanded, but unfinished fir plywood; Weytex hardboard with honeycomb core; and a hardboard with Marlite plastics surface in a natural birch wood grain pattern.

Rotary Dazotype Printers

Moderately priced machines, designed for fast printing and developing speeds are offered by Visual Communication Corp., Coulter St., Old Saybrook, Conn., an affiliate of Saybrook Mfg. Inc. Called the VC Model 10 Dazotype Printer line, the machines print at an average speed of 5 feet-per-minute. They are designed with a large copy table for feeding, variable drive, fan-cooled lamps and a removable pick-off bar. Operation is static-free. According to the manufacturer, all normal service, including cylinder cleaning and lamp changing, can be accomplished without the use of tools. Production of 14- and 42-inch models is underway.

Electric Adding Machine

Full-keyboard electric adding machine in the economy price range, has been introduced by Remington Rand, Div. of Sperry Rand Corp., 315 Park Avenue South, New York 10, N. Y. The 19½-pound unit has twin add bars, twin total keys, direct subtraction, and electric repeat for multiplication. It will list up to \$99,999.99 and will total to \$999,999.99.

Drawing Instruments

American-made compasses, dividers, and ruling pens, are available from V. & E. Mfg. Co., 758-766 S. Fair Oaks Ave., Pasadena, Calif. Manufactured in stainless steel, chrome-plated steel, and nickel-plated steel, these instruments are, according to the manufacturer, both accurate and dependable. They are engineered for heavy-duty pencil drawing, and are backed by a guarantee and service policy.

(For additional information regarding the new products described here, contact the manufacturer directly. Complete addresses are included.)

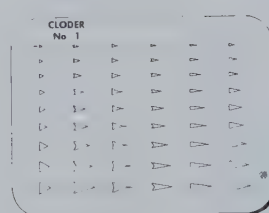


Drafting Tool

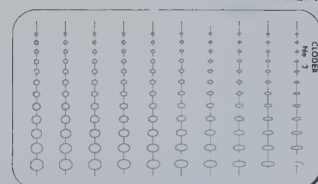
Combination triangle, T-square, and 12-inch ruler, called Rol-Ruler, is offered by Rol-Ruler Sales Co., P. O. Box 164, Riegelsville, Penna., sole agents for Specialfabrik für Technische Erzeugnissen K.G. of West Germany. The plastics tool is said to allow the drawing of parallel horizontal and vertical lines at measured distances, without lifting the ruler from the paper; built-in rollers allow movement up or down. A spiral index window automatically measures distances between horizontal lines as close as 1/16-inch. The unit is priced at \$3.95.

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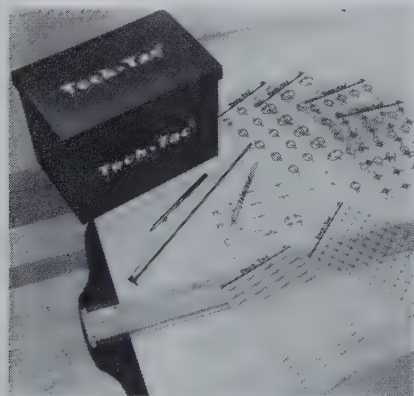
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New Products

Dry Process Whiteprinter

Engineering prints up to the 26-inch width—or approximately 98 per cent of all cut-sheet operations—are accommodated by the Arrow whiteprinter. Designed expressly for cut-sheet size originals by Copicmat, Inc. (formerly Peck & Harvey Mfg. Corp.), Chicago 45, Ill., the machine operates at speeds up to 75 feet-per-minute, with 100 watts-per-inch of light. It prints and develops automatically, and it can handle either cut sheets or roll stock. Among the noteworthy design features of the machine are: positive separation of prints and originals, front and rear delivery of prints, automatic stacking of originals on a tracing receiving tray, a safety switch cut-off which stops feed-in rollers and belt-travel when any finger-thick object is fed into the machine, and a gravity ammonia feed, said to prevent vapor lock.



Adhesive-Backed Symbols

Electronic symbols on clear acetate save drafting time for repetitive use. These dry-adhesive, pressure-applied symbols are produced by Tech-Tac., 727 West Seventh St., Los Angeles 17, Calif. The symbols can be used to produce any schematic or block diagram, ready for direct print or copy camera. The acetate surface will take pencil or ink, can be erased, rolled and stored without damage or loss of transparency. All standard symbols to fit JAN, MIL, and ASA requirements are available. A desk-top file and cross-index aids in locating any symbol in the system.



Tabletop Copying Machine

Architects and small engineering firms will be interested in a new tabletop dry-diazo copying machine, designed for good-quality, in-the-office copying. Recently announced by Paragon-Revolute, Division of Charles Bruning, Mt. Prospect, Ill., the Paragon-Revolute Rockette handles drawings, tracings and printed matter up to 42 inches wide, and of any length. A knob controls the copying speed, which can be set for a maximum of 15 linear fpm. The machine uses a 1500-watt quartz mercury vapor lamp, and operates on 200-watt, single-phase, 60-cycle current. The housing of the Rockette is 22 inches high; a 35-inch high matching floor stand is also available.

Drafting Board Light

Lighting fixture on an adjustable arm that rotates in a full 360-degree circle and extends on telescoping rods is offered for drafting table use. Called Glide-Action Trombolite, the lamps are manufactured by Amplex Corp., 214 Glen Cove Road, Carle Place, Long Island, N. Y. The lamps are designed with both incandescent lamp and fluorescent tube within a single reflector—an arrangement said to provide an improved pattern of light distribution that is easier on the eyes. Either light source may be used separately, or both may be used in combination. Glide-Action Trombolite fixtures are also available with incandescent lamp only. Trombolite's reflector design is said to provide higher levels of lighting intensity with a minimum of undesirable glare.

Pre-printed Adhesive Film

Printed matter used repeatedly on drawings or maps—such as title blocks, standard parts, etc.—can now be quantity-printed in advance on Dulseal, a transparent adhesive film. Available from Keuffel & Esser Co., Third and Adams Streets, Hoboken, N. J., Dulseal is made of 0.0015-inch thick acetate. Its matte surface takes pen, pencil or typewritten impressions. The film's adhesive has a delayed setting action; this allows material to be re-located several hours after original application, if necessary. However, in 24 hours, the adhesive "sets," forming a permanent bond with the paper or cloth to which it is applied. Dulseal is offered in 20-yard rolls of various widths and in sheet sizes up to 18 by 24 inches, pre-printed or plain. Dulseal is recommended also as a protective coating for documents which receive frequent handling, and as a mending tape.



Microfilm Indexing Kit

Convenient reference to microfilmed records depends on proper indexing. To provide a step-by-step method for locating records on microfilm, Recordak Corp., 415 Madison Ave., New York 17, N. Y., (a subsidiary of Eastman Kodak Co.) has developed an indexing kit and instruction booklet. It provides organization of the files to be filmed, together with the reference targets to properly organize the material on film. It can be used with nearly any type of microfilmer. Included in the kit are flash cards, targets, camera operator's certificates, etc. Kit and instruction booklet will sell for \$7.50 through Recordak branches.

New Products

Sketching Paper

A paper for idea sketches and quick roughs that will produce sharp copies in standard diazo, blueprint, or office copying machines, has been added to the product line of Keuffel & Esser Co., Adams and Third Streets, Hoboken, N. J. Called No. 185 Sketching Tissue, the paper is tinted a light yellow. Despite its light weight (six pounds for 500 sheets, 17 by 22 inches) the tissue is said to be unusually tough. It is available in 50-yard rolls, 42 and 48 inches wide.

Diazo Copying Machine

Tabletop copying machine, said to be the first to feature automatic separation of copies from originals before delivery, has been announced by Charles Bruning Co., Inc., Mount Prospect, Ill. Approximately the size of a typewriter, the Model 120 was designed for low-cost (about 1¼ cents a copy) reproduction of letter-sized originals on translucent paper.

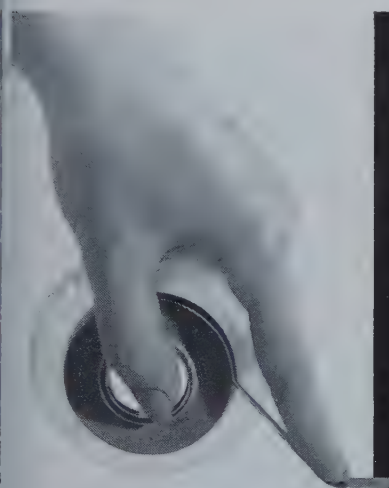
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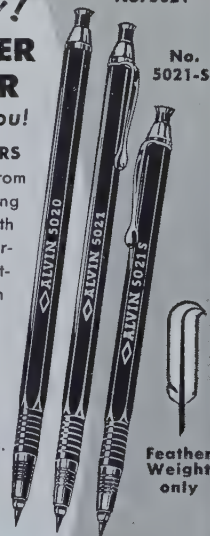
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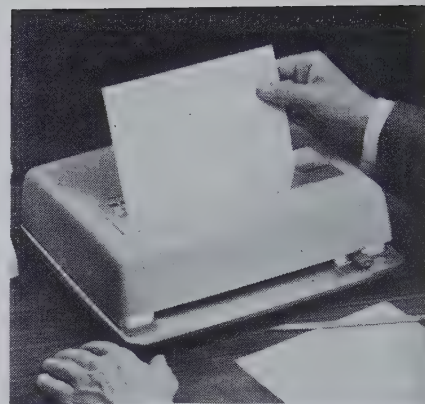


Spray-On Fixative

An aerosol-packaged fixing agent, called Fixatif, will protect any pencil tracing from smudging. Graphite lines treated with the product remain crisp and black, whether the pencil tracing is in use or filed. Manufactured by The Eagle Pencil Co., Danbury, Conn., the spray is erasable, fast-drying, and non-yellowing. Fumes and odors identified with regular fixing agents are said to be absent.

Sensitized Paper

An improved paper for direct positive reproduction using the ammonia process (dry diazotype) has been developed by Frederick Post Co., 3650 North Avondale Ave., Chicago 18, Ill. Called Vapo-Vel 209 (transparentized) and 209N (natural translucent), the paper is a 100 per cent rag content product with #14 base. According to the manufacturer, there are no special surface coatings in the sensitizing operations to obscure Vapo-Vel's vellum-like drafting qualities. Its pencil-taking characteristics are good, it can be erased with Pink Pearl or vellum-type eraser, and it takes ink without feathering. According to the manufacturer, the light-sensitive coating produces a deep brown image of unusual density, both visual and actinic. Newly improved Vapo-Vel is also said to have unusually good keeping qualities. Unexposed packages and rolls keep well for many weeks in storage without background discoloration.



Copying Machine

Desk-top copier, operating on the dry, all-electric copying principle characteristic of Thermo-Fax copying machines, has been announced by Minnesota Mining and Mfg. Co., 900 Bush Ave., St. Paul 6, Minn. Called the Courier copying machine, the unit weighs 25 pounds, and is operated by a single control. It is designed to accommodate a new bond-weight copy paper recently developed by 3M.

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New Literature

Silver Brazing Training Course, a packaged, self-study course in the techniques of silver alloy brazing, has been developed by Handy & Harmon, 32 Fulton St., New York 38, N. Y. Each course is priced at \$25.00. The course should interest tool and design engineers for the experience and insight it affords in brazing techniques and in the proper design of brazed joints.

Use of Drafting Film, a report on the cost-saving experience of engineering firms who have been using Duralar pencils and Mylar (Du Pont trademark) drafting film, has recently been published by J. S. Staedtler, Inc., Hackensack, N. J. The report includes demonstrations of the correct technique for drafting on film, and suggests procedures for changing over smoothly to the new method. Copies of the report, with samples for conducting tests, may be obtained by writing to J. S. Staedtler, Inc.

Whiteprinting Machine Brochure, describing the General Whiteprinting Machine, may be requested from The C. F. Pease Co., 2601 West Irving Park Rd., Chicago 18, Ill. The General, in 42- and 54-inch sizes, handles prints at an 85 feet-per-minute rate, and is automatic in operation.

Graphic Arts Handbook, a two-volume, loose leaf publication, containing the most recent information about photographic materials, processes and techniques, has been published by Du Pont's Photo Products Department. Priced to sell at \$6.50, the two volumes will be available through dealers in the U. S. early in 1960. Purchasers of the book will receive, at no extra cost, pages containing new and supplemental material to be issued as new products are introduced and new techniques are developed.

Combination Lamps Brochure, describing the Sunburst reflector, which incorporates both fluorescent and incandescent lamps in a single swing-arm fixture, may be obtained by writing to Swing-O-Lite, 13 Moonachie Road, Hackensack, N. J.

Unitized Microfilm System Booklet, describing the Microdealers, Inc. Filmsort (registered trademark) System and related equipment, is available from Graphic Microfilm Corp., 115 Liberty St., New York 6, N. Y., an affiliate of Microdealers.

Clean Drawing Bulletin (Form No. 45043) called *Keep It Clean!*, describes cleaning aids and protective spray marketed by Keuffel & Esser Co., Adams and Third Streets, Hoboken, N. J. Free copies may be requested.

(Copies of the literature reviewed can be obtained directly from the manufacturer or publisher. Complete addresses are included.)

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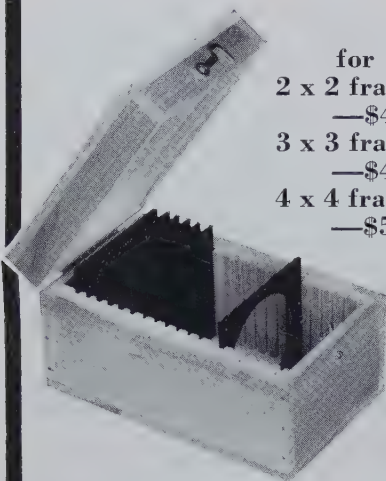
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New Literature

Surface Alloying Bulletin (No. 40), called *Designing for Chromallizing*, gives "do's" and "don'ts" for parts to be chromallized. Drawings show proper radii and blending of corners; good thread design is also illustrated. Free copies of Bulletin 40 may be requested from Chromalloy Corp., 452 Tarrytown Road, White Plains, N. Y.

Kit for Young Engineers, called *Your First 5 Years*, is available from Engineers Council for Professional Development, 33 West 39th St., New York 18, N. Y., at a cost of \$2.00 per kit. Furnished with envelope, which may be used as a professional development file, the Kit contains the following material. (1) *A Professional Guide for Young Engineers*, a 48-page reference manual consisting of selected papers by William Wickenden; (2) *The First Five Years*, a brochure outlining a six-point professional development program; (3) *Selected Reading for Young Engineers*, a listing of titles from natural science, philosophy, economics, sociology, psychology, literature, history, etc.; (4) *Personal Appraisal Form*, a self-evaluating questionnaire; (5) *Canon of Ethics*; and (6) a brief statement on *Faith of the Engineer*.

Aperture Card Brochure (Form No. A903A 8-5M-59), entitled *The Filmsort Aperture Card for Your Engineering Drawings and Allied Records*, may be obtained by writing to the Filmsort Co. (Div. of Minnesota Mining & Mfg. Co.), Pearl River, N. Y. The illustrated brochure tells concisely how Filmsort began, it describes the Filmsort aperture card, how film is mounted and how it is read. Enlarging from microfilm is discussed, as is the making of prints from these enlargements. Extensions of the Filmsort system that may be made with Duplicards and the use of Filmsort's Uni-printer are also outlined. Finally, the benefits resulting from adoption of this Unitized Microfilm System are summarized. Filmsort distributors in the United States, Canada and in other parts of the world are listed.

Technical Typewriter Booklet outlines a method of typing special mathematical symbols and equations using the interchangeable type bar available on the Remington Electric machine. Ordinary typing skills are said to permit efficient use of the machine for these special uses. The booklet can be obtained at any Remington Rand branch office, or by writing to the company at 315 Park Avenue South, New York 10, N. Y., and requesting R 8964.10.

Tools Catalog (Bulletin No. 143, Issue 1, 1-1-60) is an illustrated listing of precision tools, including such items as steel tapes, divider and beam compasses, plumb bobs, scribes, etc. Copies may be requested from The L. S. Starrett Co., Athol, Mass.

Design and Purchasing Manual on miniature and instrument ball bearings is available free to qualified engineering personnel. Complete specifications on 370 standard New Hampshire bearings from 1/10 to 5/8 OD are included, as well as 22 engineering bulletins discussing factors in bearing life and operation. Requests for the manual should be on company letterhead, addressed to New Hampshire Ball Bearings, Inc., Route 202, Peterborough, N. H.



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The Book Shelf

ARCHITECTURAL RENDERING: The Techniques of Contemporary Presentation, by Albert O. Halse, A.I.A., 277 pages, 8 $\frac{3}{4}$ by 11 $\frac{1}{2}$ inches, over 300 illustrations, Dodge Books, F. W. Dodge Corp., 119 W. 40th St., New York 18, N. Y., 1960 (\$15.75)

GOOD ARCHITECTURAL RENDERINGS have a fascination for artist, layman and fellow architect alike. They are mechanically precise, they are knowing, and above all they are esthetically pleasing. They represent the skilled magic of pictorial excellence that artists today have abandoned largely to the camera.

Albert O. Halse, in his handsome volume, has attempted to look at the subject of architectural rendering from an historical point of view, and also to supply a generous amount of technical information as to just how to go about it. He brings to his task an impressive amount of scholarship, plus some 30 years of practical experience as teacher, architect and professional delineator.

To quote Dr. Halse, writing in the Forward, "Few books have been available for those who wish to learn about the art of rendering, and most of these have dealt with a single medium per volume." It is evident, therefore, that his book cannot present an exhaustive study of all media examined. He does a remarkable job, nonetheless, of supplying useful tips as to how to proceed with each of eight or nine; these include pencil, pen and ink, smudge charcoal, Chinese ink, water color, tempera, airbrush, pastels and combinations of some of these.

There are chapters on perspective, color, basic equipment and general approach to rendering. The historical introduction to the entire subject is illuminated with particularly good examples of Egyptian, Roman and Renaissance draftsmanship. Student renderings are freely used to illustrate techniques; some of these are excellent. And, there is a gallery of professional renderings to top things off.

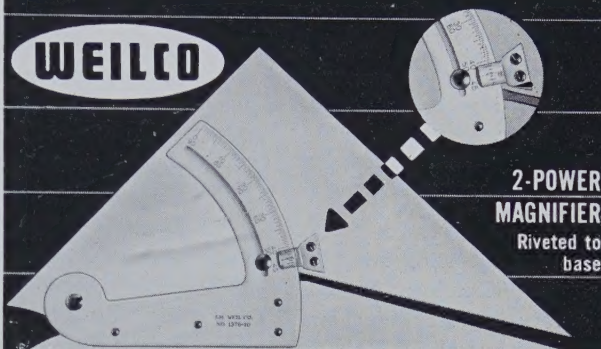
Dr. Halse appears to think it reasonable that the student or earnest amateur would do well to familiarize himself with every available medium, in order to discover those best suited to his talent. Since the professional architectural renderer is likely to be a "special breed of cat" who has dedicated himself to the painstaking mastery of a single medium, or possibly two, this is a refreshing idea. It represents a teacher's inextinguishable conviction that the student with the desire to learn can assimilate limitless amounts of data.

To all of us who cherish the notion that the distinguishing characteristic of the educated man is that he possess a continuing desire to learn, this is comforting indeed.

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WANTED: Clearer Status

Editor's Note: The writer of the following letter is the manager of an engineering department of a large manufacturer. Associate Editor Wladaver recently visited the plant, and interviewed the writer.

Dear Dr. Wladaver:

I have read with interest recent issues of GRAPHIC SCIENCE. At last a very important nucleus of engineering is acquiring the status it deserves. A recognition that all engineering development of any value is only as precise as its design, influences my sincere respect for drafting.

In our department, (the Engineering Department you visited recently), the drafting section seems to occupy a middle-place squeeze. None of our engineers are draftsmen, and none of our draftsmen are engineers. Some of our draftsmen are young, and many of them have had little more than a high school education. Yet they are carrying the responsible work load of developing and drawing up the designs of engineers.

Frequently, with only the meager instructions of a single-page design

specification, the draftsman starts on his burdensome journey across his board. Too often he is delayed because of insufficient follow-up on the part of the engineer. Too often he is harassed because he cannot find the engineer when he needs instruction, and he is plagued with a limited time schedule. More than he should, the engineer often merely glances at the drawing at sign-off time; he does not study it. Yet when mistakes are uncovered during product verification, the engineer blames the draftsman, insists on stupendous checking layouts for everything and anything, and makes everyone feel generally miserable.

Yes, Dr. Wladaver, you are right, —I am not in good humor this morning, and we need help. We need the written guidance of a text or brochure, or a procedure or a system that outlines a speedy, wholesome, economical practice (a knowledgeable application, not theory) of performance between the engineer and the draftsman. One that explains the detailed responsibilities of both skills.

Where does the engineer's responsibility begin and end, likewise for the draftsman, and how do we systematize the smooth interchange of their responsibilities?

It appears as though no system presently exists. Well, we do have what is believed to be a rational system, but the real problem is its enforcement. It seems as though each party tends to shirk his responsibility, and my sympathy does not favor the more skillful, higher-salaried engineer who points his finger toward the party of lesser responsibility—the draftsman.

That is why we need the written document to convince the engineer that the draftsman is not his flunky who deserves all the blame. We need a document with teeth in it to show the engineer how to measure up to his stature of professionalism—which he justly deserves, providing he earns it by carrying his share of the load.

Perhaps in your experience you know and can tell us where to acquire what we are seeking. We will gratefully appreciate anything that you can do for us.

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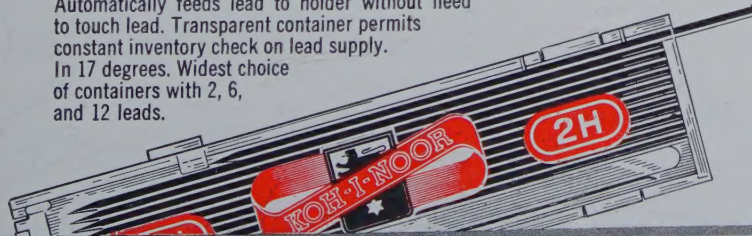
In 7 "color-coded" precision line widths: 00, 0, 1, 2, 2½, 3, 4. Uses India (or regular) ink for ruling, lettering, tracing or writing with equal facility.

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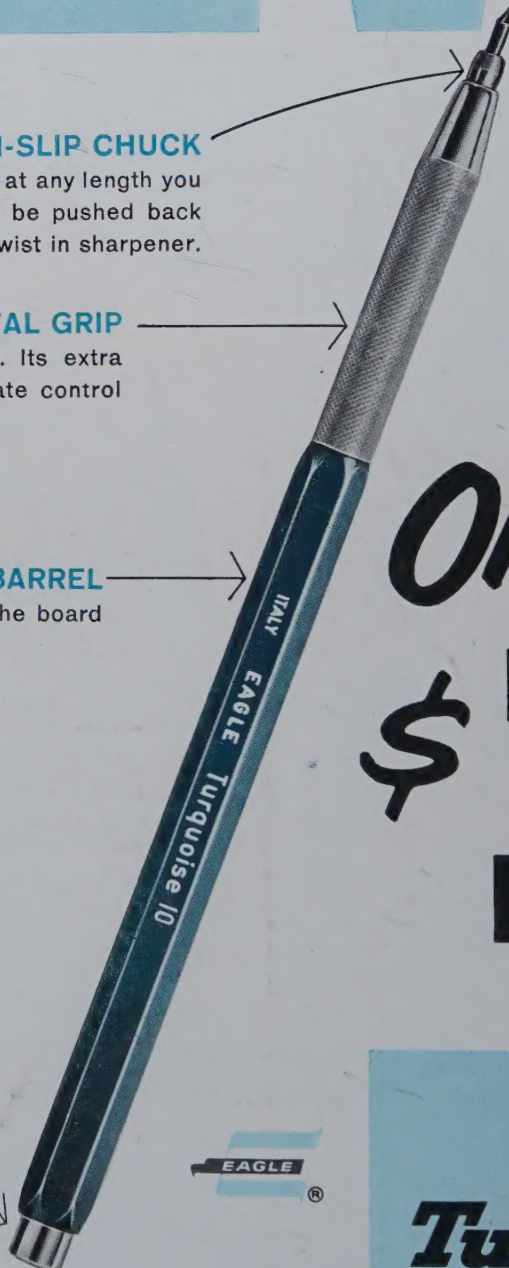
is knurled for easier holding. Its extra length gives you more accurate control with less finger tension.

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is unbreakable. And it can't roll off the board because it's hexagon-shaped.

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